EYEWITNESS HANDBOOKS

MUSHROOMS

The visual guide to more than 500 species of mushroom from around the world

Winter Polypore

Common Stump Psathyrella

Fly Amanita

Green Stain Cup

Mottled Poison Cort

Crimson Wax Cap

Yellow-Banded Cort

Luminescent Panellus

Thomas Læssøe
Gary Lincoff

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DK PUBLISHING, INC.

A DK Publishing Book

Important Notice
The author and publishers strongly advise anyone gathering fungi for eating to seek the help of an experienced mycologist. Never eat any fungus unless you are 100% certain of its identity. We accept no responsiblity for readers who do not follow this advice.

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First American Edition, 1998

2 4 6 8 10 9 7 5 3

First published in the United States by
DK Publishing, Inc. 95 Madison Avenue
New York, New York 10016
Visit us on the World Wide Web at
http://www.dk.com

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Dorling Kindersley Limited, London
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Læssøe, Thomas.
Mushrooms / by Thomas Læssøe and Gary Lincoff. -- 1st American ed.
p. cm. -- (Eyewitness handbooks)
Includes index.
ISBN 0-7894-3286-2 hardcover
ISBN 0-7894-3335-4 flexibinding
1. Mushrooms--Identification.
2. Mushrooms--Pictorial works.
I. Lincoff, Gary. II. Title. III. Series.
QK617.L248 1998
579.6--dc21 97-44418
GIP

Reproduction by Colourscan, Singapore
Film output by The Right Type, England
Printed and bound in Singapore
by Kyodo Printing Co.

Contents

Introduction *6*
Introduction *6*
How This Book Works *9*
What is a Mushroom? *10*
Fruitbody Shapes *12*
Cap Features *14*
Spores and Spore Dispersal *16*
Mushroom Lifestyles *18*
Mushroom Habitats *20*
Foraying for Mushrooms *22*
Identification *24*

Cap & Stem Fungi with Decurrent Gills *28*
Funnel-shaped with Fibrous Flesh *28*
With Convex Cap and Fibrous Flesh *37*
Crumbly Flesh Exuding Milk *43*

Cap & Stem Fungi with Adnexed to Adnate Gills *56*
Fleshy with No Obvious Veil *56*
With Cobweblike Veil *69*
With Stem Ring or Ring Zone *78*
With Fibrous Cap and Dark Spores *98*
Medium-sized with Smooth Cap *103*
With Crumbly Flesh *120*
Very Small with Smooth Cap *132*
Very Small, Cap not Smooth *142*

Cap & Stem Fungi with Free Gills *145*
With Volva and/or Veil Scales on Cap *145*
With Stem Ring or Ring Zone *156*
Without Veil *171*
Inky with Age *174*
With Gills Joined to a Collar *177*

Cap Fungi with Stem Off-center or Absent *178*

Cap & Stem Fungi with Pores *184*
With Soft Flesh *184*
With Tough Flesh *202*

Honeycomb-, Brain-, or Saddlelike Cap *207*

Bracket- or Skinlike *211*
With Pores *211*
Wrinkled or Smooth Underneath *228*
Skinlike; Growing Flat or Crustlike *232*

Fungi with Spines *234*

Club-shaped Fungi *240*
Smooth or Hairy *240*
With Pimples or a Dusty Surface *244*
Phallus-shaped *246*

Antler- to Coral-like Fungi *248*

Rounded Fungi *253*
Above Ground *253*
Below Ground *258*

Pear- to Pestle-shaped Fungi *260*

Cup- to Disk-shaped *264*
Without "Eggs" *264*
Cup-shaped Containing "Eggs" *274*

Trumpet-shaped Fungi *275*

Star-shaped & Cagelike Fungi *277*

Ear- or Brainlike, Gelatinous Fungi *281*

Spore Chart *284*
Glossary *289*
Index *290*
Acknowledgments *304*

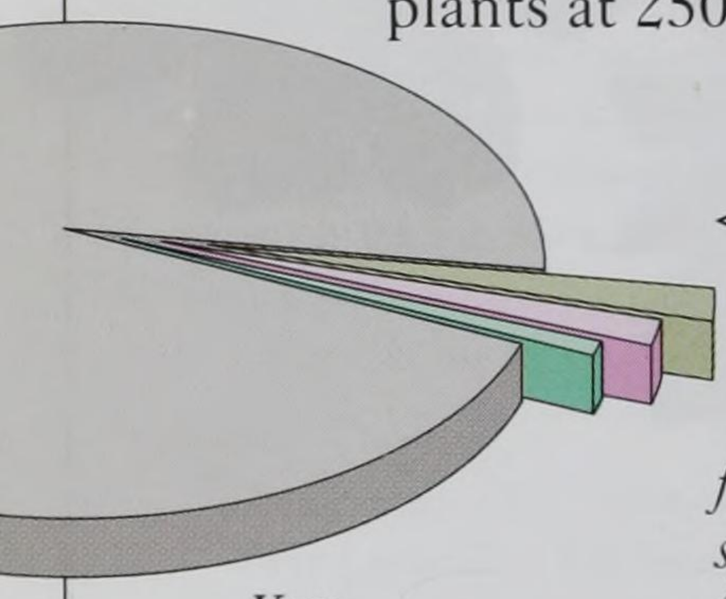
INTRODUCTION

The fungal kingdom is enormous, with fungi occurring in all habitat types all over the world. Ranging in size from microscopic yeasts to large, fleshy mushrooms, fungi also have highly diverse lifestyles, some forming beneficial relationships with living plants, others degrading or even killing their hosts. All play a vital role in the processes that govern life on our planet.

△ FLY AMANITA
The colorful but poisonous Amanita muscaria *is perhaps the best known of all fungus species.*

THE STUDY of the fungal kingdom is referred to as mycology. Until comparatively recently, fungi were simply considered to be a lower form of plant life and were studied as part of botany. They were also often regarded with suspicion due to their habit of appearing seemingly out of nowhere after rain. These factors perhaps help explain why there are so many fungi as yet undescribed, although the sheer volume of species is also an important reason. Current estimates put the number of species in the fungal kingdom at approximately 1.5 million, compared to, for example, flowering plants at 250,000 species.

Mycologists believe that only about 80,000 of these species have been properly documented – fewer than five percent of the estimated total number in existence. Of the undescribed species up to this point, many are thought to inhabit tropical rain forest areas, but even in much more accessible regions such as northern Europe, which have been quite closely studied, new species are still being discovered, including some that are large and fleshy.



◁ FUNGUS COUNT
This pie chart represents the world's 1.5 million species of fungi. The "slices" show species identified so far: 28,700 macro- (fruitbody-forming) fungi; 24,000 rusts, smuts, and molds, and 13,500 lichens.

SECRET LIFE

Most of us are familiar with mushrooms and toadstools, found mostly in wooded areas in the fall, but fewer people are aware that each of these is simply the "fruitbody" of a much larger organism

LICHENS ▷
*A lichen is a compound organism, the result of an association between a fungus and algae. Lichens survive on nutrients filtered from the air, aided by the photosynthesis of the algal partner. They also take up air pollutants, so are useful indicators of air quality. The picture shows the very common lichen Yellow Scales (*Xanthoria parietina*).*

USEFUL FUNGI ▷

Fungi are an essential part of life, playing vital roles in many areas. They are used as food, as flavoring, and to produce alcohol. Antibiotics are made from them, and they contain enzymes that are used in detergents.

DETERGENT
The cleaning agents in detergents contain enzymes that have been extracted from fungi.

PENICILLIN
Penicillium *molds produce a chemical that kills bacteria and is used in antibiotics.*

BLUE CHEESE
The flavoring in blue cheese is produced by the mold Penicillium roqueforti.

SALAMI SAUSAGES
Salami is flavored and protected by the mold Penicillium nalgiovense.

BEER
Beer is brewed using a yeast fungus like Saccharomyces carlsbergensis.

BREAD
Bread dough rises through the action of the yeast fungus Saccharomyces.

that is concealed in the soil, wood, or other material (substrate) on which the fruitbody is growing. Fruitbodies are produced to enable the dispersal of spores, by which fungi reproduce. However, there are many other species that never produce fruitbodies. Most of these are molds, such as those that occur on old foods like stale bread.

MACROFUNGI

Only those fungi that produce more or less conspicuous fruitbodies are featured in this book. Mycologists refer to them as "macrofungi," but most are popularly known as mushrooms or toadstools. They are diverse in form, varying from the well-known cap and stem type to those species with shelflike fruitbodies and those that grow flat (see pp.12–13). Despite this diversity, the fruitbodies of some closely related fungi can look very similar and thus require careful examination for accurate identification. This book will assist in identification and increase your understanding and enjoyment of the fungal kingdom.

EDIBLE FUNGI

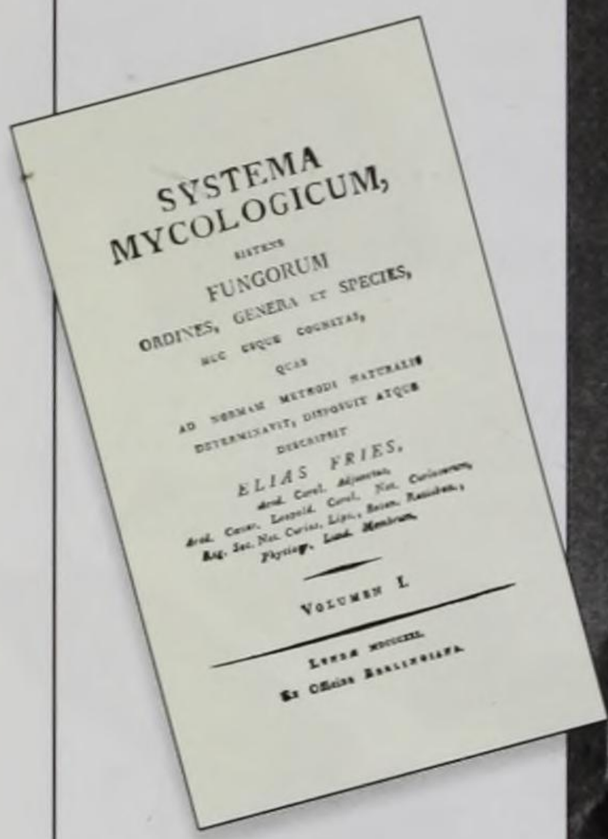
Although not common in all cultures, the gathering of fungi for eating is an ancient practice. The Shiitake (*Lentinula edodes*) has been cultivated in China and Japan for hundreds of years, and the cultivated mushroom (*Agaricus bisporus* p.161) has long been grown commercially. Today, oyster mushrooms (*Pleurotus* species pp.178–79) and several other species are widely cultivated, while huge quantities of morels, chanterelles, and boletes are wild-collected and sold worldwide.

Before eating any mushroom that has been collected from the wild, be sure it is correctly identified as edible (see also p.23). If poisoning is suspected, seek medical advice immediately and take along a sample of the mushroom.

SHIITAKE MUSHROOMS

AGARICUS BISPORUS

OYSTER MUSHROOM


SYSTEMA
MYCOLOGICUM,
SISTENS
FUNGORUM
ORDINES, GENERA ET SPECIES,
HUC USQUE COGNITAS,
QUAS
AD NORMAM METHODI NATURALIS
DETERMINAVIT, DISPOSUIT ATQUE
DESCRIPSIT
ELIAS FRIES,
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△ ELIAS FRIES *(1794–1878)*
Elias Fries was an outstanding early mycologist. His Systema Mycologicum *(1821–1832) laid the foundations for the modern classification system.*

EATING WILD MUSHROOMS

As well as making identification easier, the species section of this book also details edibility. However, it is strongly recommended that beginners take along an experieced forager if they are gathering mushrooms for eating; many fungi are, or can be, poisonous. There are also some edible species that look very similar to poisonous ones (see p.23). The species entries warn of any specific dangers relating to each fungus. The effects of eating a poisonous mushroom vary from a stomach upset to severe or even fatal liver damage, so it is not advisable to experiment.

◁ DEADLY SPECIES
Amanita virosa *(far left) and* Amanita phalloides *(left) cause severe liver damage or death if they are eaten.*

AMERICAN MUSHROOMS

This edition is based on the premise that mushrooms whose photographs and original descriptions come primarily from Europe can be used to identify North American collections. To make a usable field guide for both beginners and more experienced collectors, many of the common names used incorporate part of the scientific generic name and are based on field-observed characteristics.

CLASSIFICATION OF FUNGI

Within the fungal kingdom there are three major phyla (see p.11). These are divided into classes, then orders. Within orders, fungi with similar traits are grouped into families and then genera, which link closely related species. Each subdivision has its own scientific (Latin) name; the name for individual species consists of the genus name and a specific epithet.

As an example, the full classification for Common Chanterelle (*Cantharellus cibarius* p.28) is shown below.

KINGDOM
Fungi

PHYLUM
Basidiomycota

CLASS
Hymenomycetes

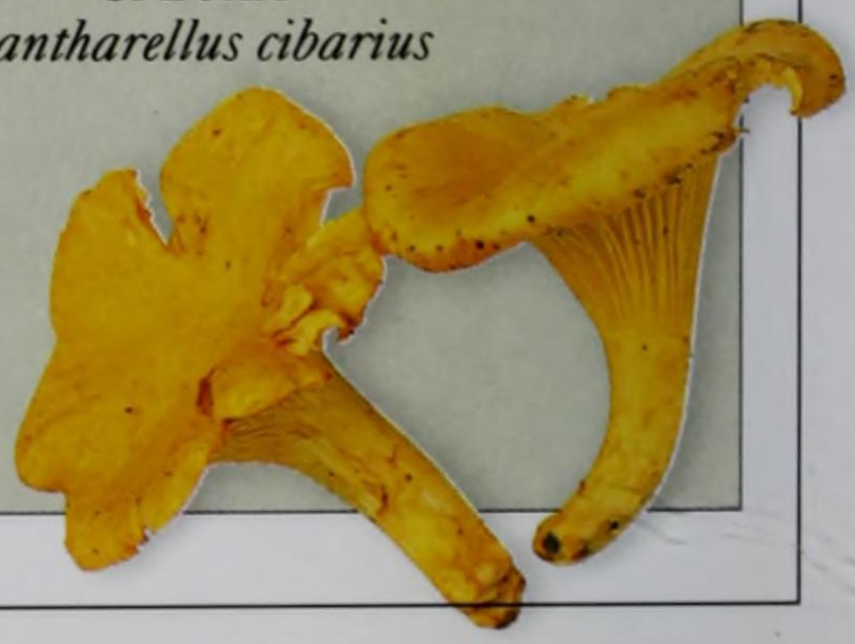
ORDER
Cantharellales

FAMILY
Cantharellaceae

GENUS (PLURAL GENERA)
Cantharellus

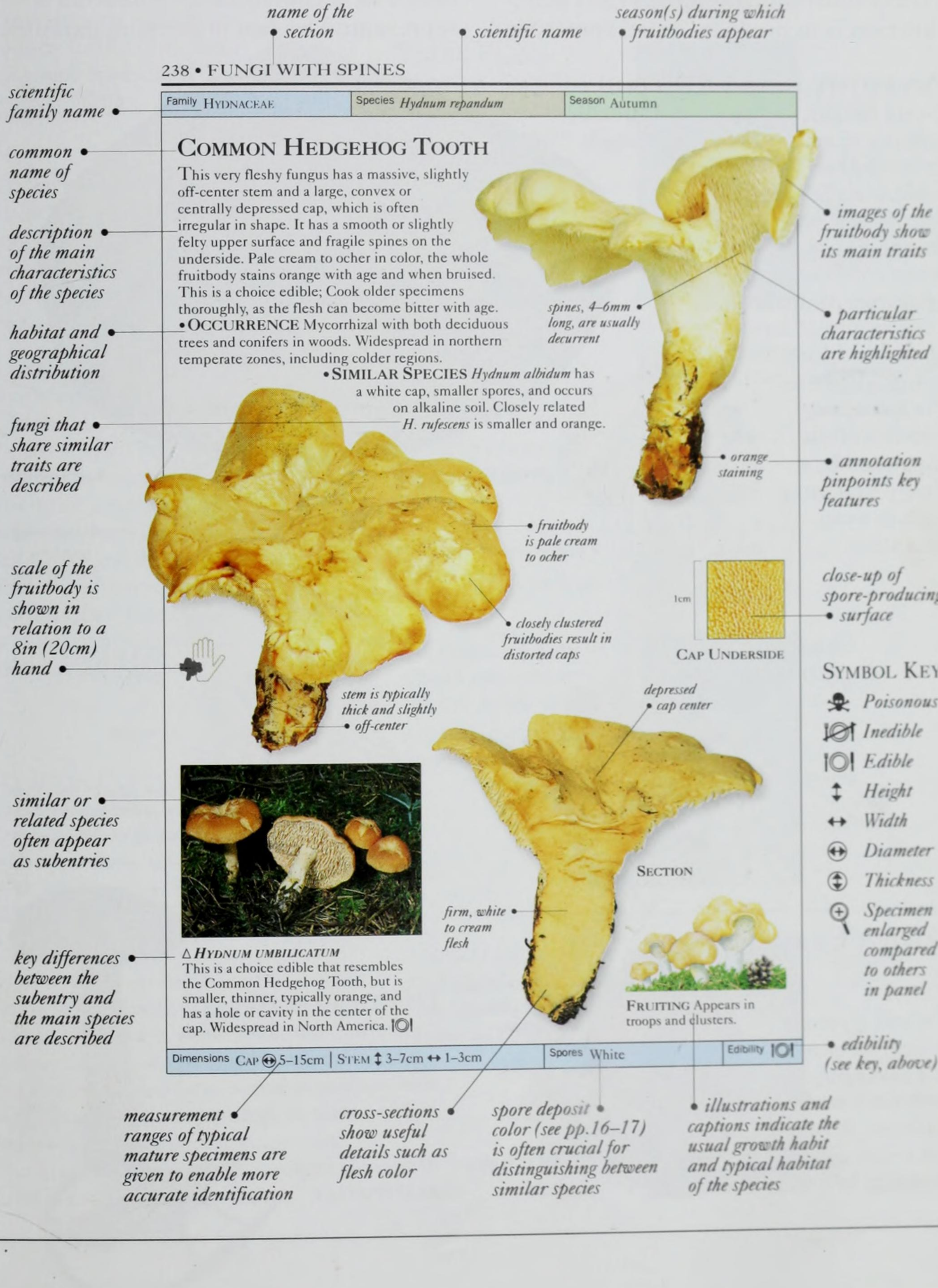
SPECIES
Cantharellus cibarius

Cantharellus cibarius ▷



How This Book Works

THE FUNGI FEATURED in this book are placed in one of 16 main sections, based on their most obvious visual characteristics (see pp.24–27). To make identification even simpler, the larger sections are divided into subsections according to more detailed traits. Most of the fungi are shown at slightly smaller than life size; a few are enlarged to show more detail.



WHAT IS A MUSHROOM?

IN POPULAR USAGE, mushrooms are fungi that produce conspicuous fruitbodies. Often the only visible part of a fungus, fruitbodies vary from the well-known cap and stem type shown below to the variety illustrated on pp.12–13. Their function is to produce sexual spores, and mycologists divide most fungi into three groups, or phyla, according to the way in which they do this (see p.11). The majority of species in this book belong to Basidiomycota; all but two of the others to Ascomycota. Zygomycota is represented by two mushroom parasites.

ANATOMY OF A FRUITBODY

Every fungus, including its fruitbodies, consists of masses of minute threads called *hyphae*. Hidden in the substrate, the hyphae form into *mycelia*, which produce fruitbodies on the surface when conditions are favorable. All fruitbodies have an area of fertile, spore-producing tissue, known as the *hymenium*, which is often supported by a fleshy structure, such as a cap on a stem.

OTHER FEATURES

VEIL

The veil, if present, protects all or part of a young fruitbody. On a mature fruitbody, its remains can be seen as scales, a stem ring, or a volva.

AMANITA FULVA

HYPHAL CORDS

Some fruitbodies have thick hyphal cords attaching them to the mycelium hidden within the substrate.

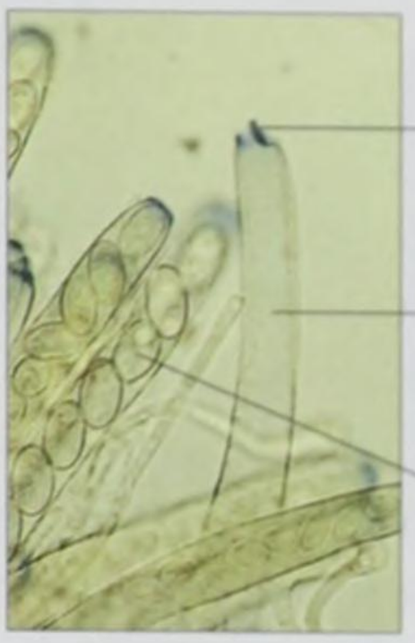
MEGACOLLYBIA PLATYPHYLLA

ASCOMYCOTA

Ascomycetes form spores inside tiny saclike structures called asci, each typically producing eight spores. Asci are sited within the hymenium. The hymenium may be on the outside of the fruitbody, such as in morels, or the asci may be loosely distributed inside the fruitbody, as they are in truffles. Many ascomycetes do not produce fruitbodies, but reproduce by asexual spores (*conidia*).

COMMON MOREL ▷
Morchella esculenta
forms spores within asci lining the honeycomb-like structure of the cap.

CUP-FUNGUS ASCI ▷
Here, some of the asci have discharged their spores, while others still contain spores that are not yet mature.



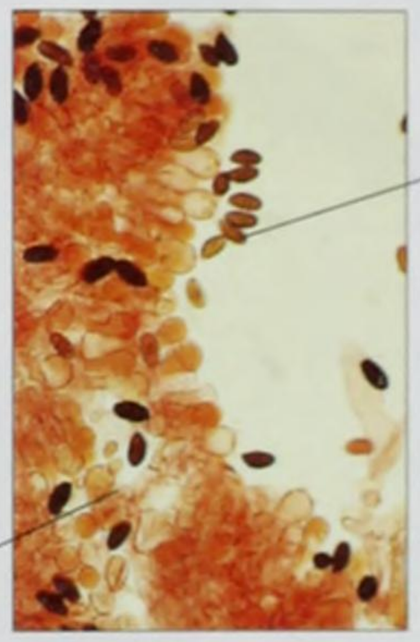
FALSE FLASK-FUNGUS ASCI ▷
Once the spores in these asci have reached maturity, they are released through an opening in the top.

BASIDIOMYCOTA

Nearly all basidiomycetes produce fruitbodies. The hymenium consists of club-shaped cells (*basidia*) with outgrowths (*sterigmata*) at one end, on which the spores are formed. On each basidium there are typically four sterigmata, each producing one spore. Many basidiomycetes are further distinguished from other fungi by clamp connections between their hyphae.

COMMON PUFFBALL ▷
Lycoperdon perlatum
forms spores on basidia in the hymenium, which is in the top of the fruitbody.

GILL SURFACE ▷
Basidia with spores at different stages of maturity can be seen on this gill surface.



HYPHAL CLAMP ▷
Clamp connections between hyphae are a typical feature of many basidiomycetes.

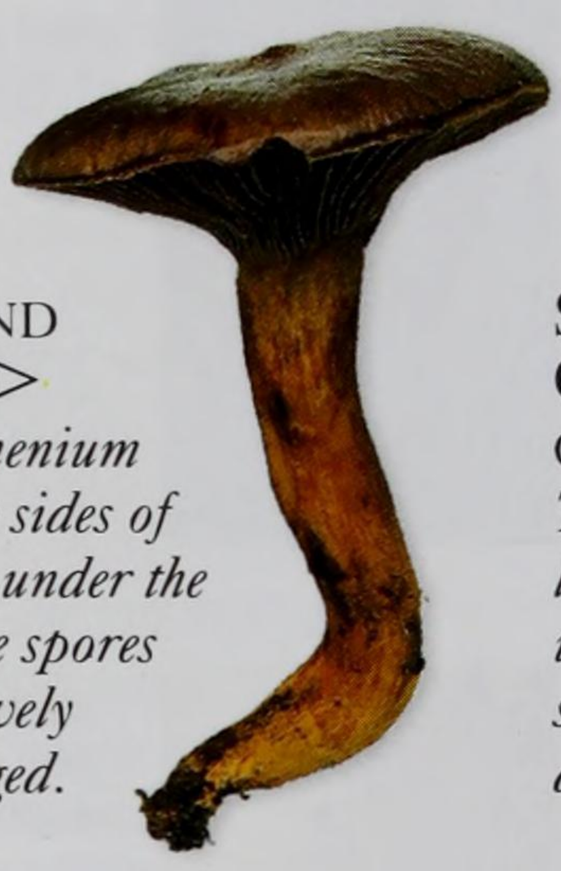
ZYGOMYCOTA

Zygomycetes do not have fruitbodies. Their sexual spores (zygospores) are long lived and are able to wait for perfect conditions before germination. Zygomycetes also form asexual spores in structures called sporangia at the end of threadlike sporangiophores. The gray molds found on foods or dung are mainly zygomycetes.

SPINELLUS FUSIGER ▷
This species consists of masses of threadlike sporangiophores.

FRUITBODY SHAPES

FUNGAL FRUITBODIES occur in a wide range of forms, with several different ways of arranging the spore-producing hymenium. This may be found on gills, in tubes, or on smooth surfaces on the fruitbody; in some fungi it is concealed inside. When the fruitbody is mature the spores are dispersed either actively or passively (see also pp.16–17). The shape of the fruitbody can reveal the method of spore dispersal. For example, tuber-like, rounded fruitbodies, found below ground (pp.258–59), have internal spores that are passively dispersed.



CAP AND STEM ▷
The hymenium lines the sides of the gills under the cap. The spores are actively discharged.

STEM OFF-CENTER OR ABSENT ▷
The hymenium lines the gills under the cap. The spores are actively discharged.

SADDLE-LIKE CAP ▷
The hymenium lines the folds of the cap. The spores are actively discharged.

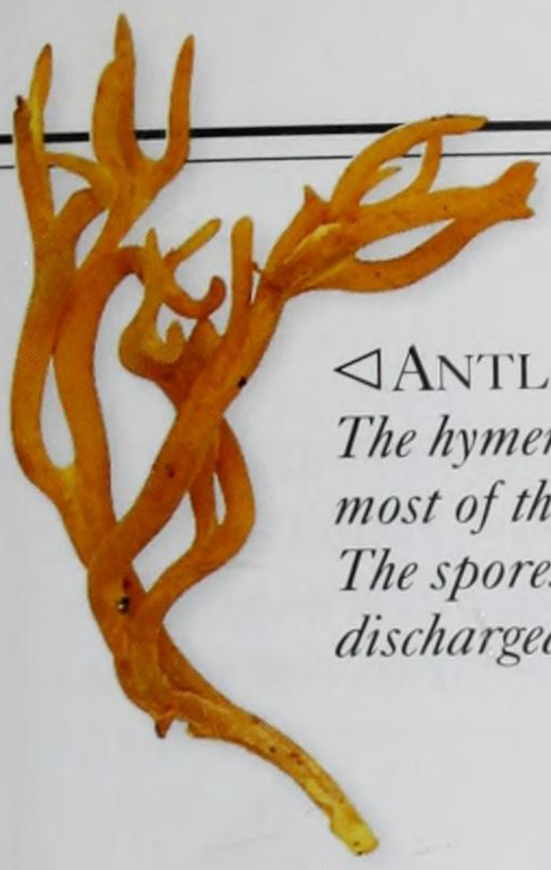
HONEYCOMB-LIKE CAP ▷
The hymenium lines the cavities in the cap. The spores are actively discharged.

BRACKETLIKE ▷
The underside is smooth or has tubes lined with the hymenium. The spores are actively discharged.

SKINLIKE, GROWING FLAT OR CRUSTLIKE ▽
The hymenium covers most of the fruitbody surface. The spores are actively discharged.

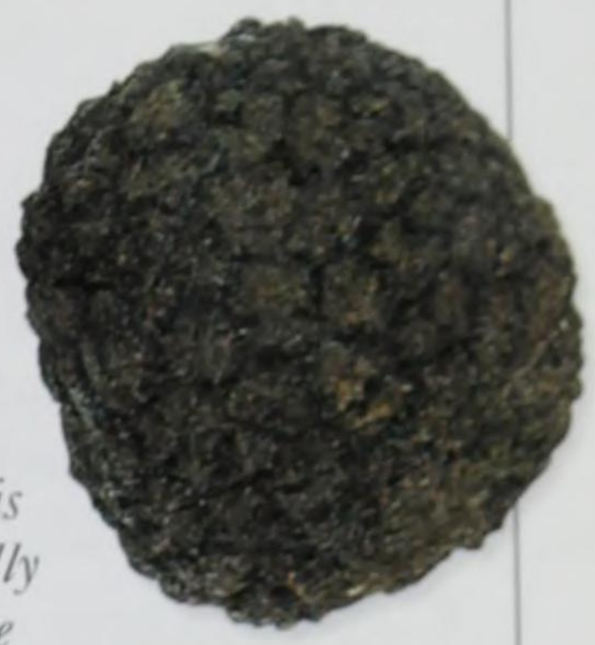
◁CLUB-SHAPED
The hymenium either covers the surface or is situated in flasks embedded in the flesh. The spores are actively discharged.

PHALLUS-SHAPED ▷
The hymenium is formed within an egglike structure and is then elevated on a stem. The slimy spore mass is dispersed by flies.



◁ ANTLERLIKE
The hymenium covers most of the surface. The spores are actively discharged.

CORAL-LIKE ▷
The hymenium covers most of the surface. The spores are actively discharged.



ROUNDED ▷
The hymenium is formed internally or in flasks. The spores are passively or actively discharged.

◁ PEAR- TO PESTLE-SHAPED
The hymenium is formed internally. The spores are passively dispersed, often by raindrops.

△ CUP- OR DISK-SHAPED
The hymenium lines the inner or upper side. The spores are actively discharged.

CUP-SHAPED CONTAINING "EGGS" △
The "eggs" have an internal hymenium. The whole "egg" is propelled by rain splashes.

◁ TRUMPET-SHAPED
The hymenium is on the smooth to wrinkled outer surface. The spores are actively discharged.

STAR-SHAPED ▷
The hymenium is formed in a closed structure that splits. The spores are dispersed by rain splashes or flies.

CAGELIKE ▷
The hymenium is within a structure that splits into a mesh. The spores are dispersed by insects.

EARLIKE ▷
The hymenium is on the surface of the lobes. The spores are actively discharged.

LOBED AND GELATINOUS ▷
The hymenium is on the surface of the lobes. The spores are actively discharged.

Cap Features

The cap can provide lots of clues to the identity of a species. Its overall shape and features on the surface, such as scales or marginal threads (indicating remains of the veil) are important. Key characteristics include any structures on the underside of the cap, such as gills or pores, and their attachment to the stem.

Cap Shapes and Surfaces

Cap shape and surface texture can change as the fruitbody matures, so try to examine several specimens. A usually sticky surface may become nonsticky in dry weather. Test it by touching it with a moistened lower lip (the "kiss" test). If it sticks to the lip, it will have been sticky in more humid conditions.

Convex
Cap is more or less the shape of a bun

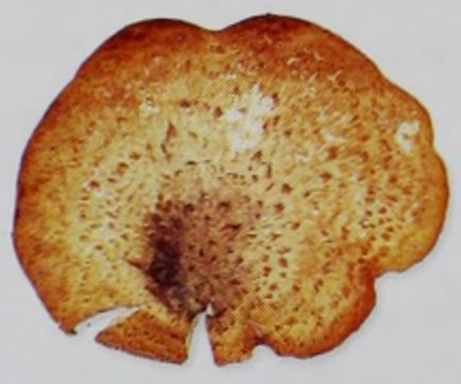
Conical
Cap is cone- or almost cone-shaped

Funnel-shaped
Cap has a depressed center

Umbonate
Raised boss in center of cap

Loose Scales
Removable veil scales

Pleated
Surface of cap is folded radially into pleats



Scaly
Cap skin is covered with fixed scales

Striate
Striations are gills seen through cap skin

Grooved Margin
Distinct radial ridges at edges of cap

Concentric Zones
Different color zones

Shaggy
Dense layer of long, fibrous scales on cap

Sticky
Cap skin is sticky-slimy (may dry up)

Inrolled Margin
Cap edge rolls inward, especially when young

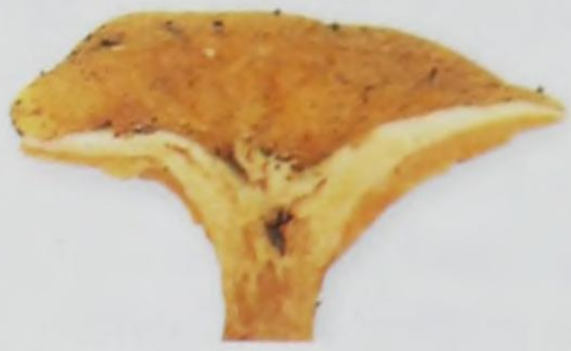
Folded
Whole cap consists of many folds of flesh

Saddle-shaped
More or less folded cap, shaped like a saddle

Honeycombed
Cap with indented cells similar to a honeycomb

Gills in Section

If the cap has gills it is vital to note how, and if, they are attached to the stem (if present). This is seen by cutting out a section with a sharp knife. Free gills are not connected to the stem, which can often be loosened from the cap by twisting. If only a very narrow part of the gill runs down the stem, this is often called decurrent with a tooth.



Decurrent
Gills run down stem, slightly or markedly

Adnate
Broadly attached gills

Adnexed
Narrowly attached gills appear almost free

Free
Gills not joined to stem, which can be removed

Notched
Gills indented just before joining stem

Sinuate Notched
Curved and indented before joining stem

Gills from Beneath

Taking note of the cap underside can be useful in identification. For example, the proportion of full-length gills to shorter gills is an important feature, as is the number of gills and the distance between them.

Equal
All gills reach stem and are the same length

Unequal
Full-length gills mixed with shorter ones

Forked
Gills divide one or several times

Crowded
Gills are arranged very close together

Widely Spaced
Gills are far apart from each other

Joined to Collar
Gills joined at a collar instead of reaching stem

Radiating
Gills radiate from the margin of the cap

Other Spore-producing Surfaces

Instead of having gills, some cap and stem fungi and bracketlike species have the hymenium on surfaces that are smooth to wrinkled, toothed, or in tubes. Rounded to angular pores on the fruitbody underside indicate that the hymenium is in tubes.

Gill-like Veins
Hymenium covers folds and wrinkles on the undersurface

Tubes with Pores
Hymenium lines tubes, which are vertical with porelike openings

Spines
Hymenium positioned vertically on spine-shaped structures

Spores and Spore Dispersal

Fungi produce spores to colonize suitable substrates, and just one fruitbody can produce billions of them. Spores can be asexual or sexual. Asexual spores (conidia) may produce individual mycelia that can then grow on their own. Sexual spores can sometimes establish independent mycelia, but often a fusion with another mycelium has to take place before they can continue to grow.

How Spores are Dispersed

Spores can be dispersed either passively or actively. Passive dispersal relies on animals, wind, or water; active discharge occurs when the fruitbody itself has a special mechanism that ejects or propels the spores when they reach maturity.

Ejection

In flask fungi, including this Xylaria, *the mature asci eject the spores some distance through the mouths of the tiny fruitbodies.*

By Animal

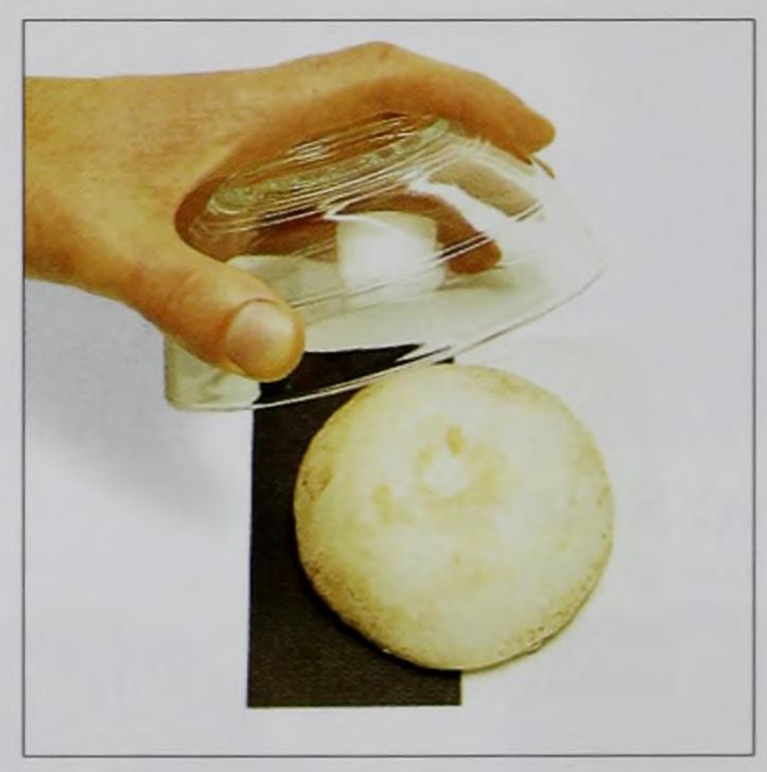
Sticky spore masses, such as on this Phallus *species, are eaten by insects. Some spores stick to the insects and are borne away.*

By Water and Wind

As rain falls on the fruitbodies of puffballs like this Lycoperdon, *they compress and the spores are released, to be dispersed by wind.*

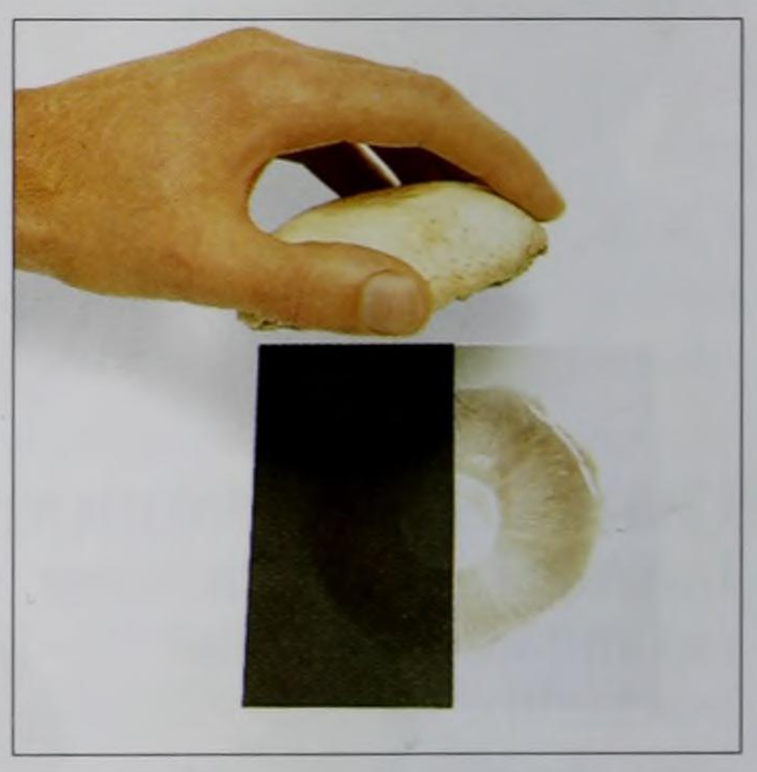
Spore Deposits

A useful way of confirming the genus to which a fungus belongs is to find out the color of its spore deposit. Taking a spore deposit from a gilled mushroom (agaric) is an easy process and can produce fascinating results: it reveals both the pattern of the gill spaces and the color of the spores. Cut the cap from a fresh specimen and place it gill-side down on paper. Use black paper to take pale spore deposits; for unknown colors, place the cap half over white paper and half over black paper.



1 Covering the Cap

Remove the stem and place the cap, gills down, on the paper. A drop of water on the cap keeps it moist. Cover with glass – a bowl or tumbler – and leave for several hours or overnight.



2 Removing the Cap

Gently lift the glass, then the cap to reveal the spore deposit. The thicker the deposit, the easier it is to get an accurate idea of the spore color. The deposit should be observed in natural light.

Spore Color

Species within a genus typically have spore deposits of more or less the same color, so the genus of a specimen can be revealed by its spore color. For example, all *Agaricus* species have spores in dark brown shades. In some genera, such as *Russula* (pp.120–31), the spore color can also be used to differentiate between similar species. Spore deposits are usually black, white to cream, or red, purple, or brown shades. Exceptions include *Chlorophyllum molybdites* (p.166), which has a green deposit.

Pinkish to Red

Ocher to Clay

Black

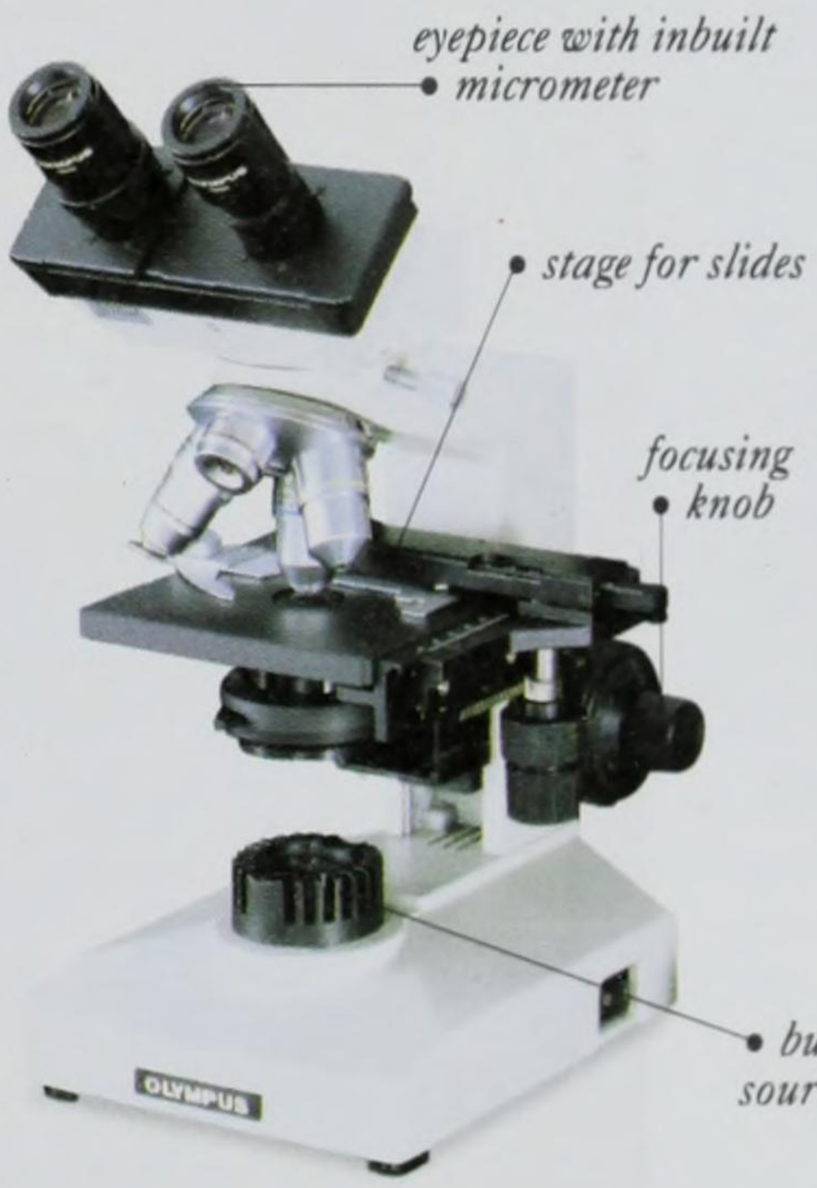
White to Cream

Purple-brown

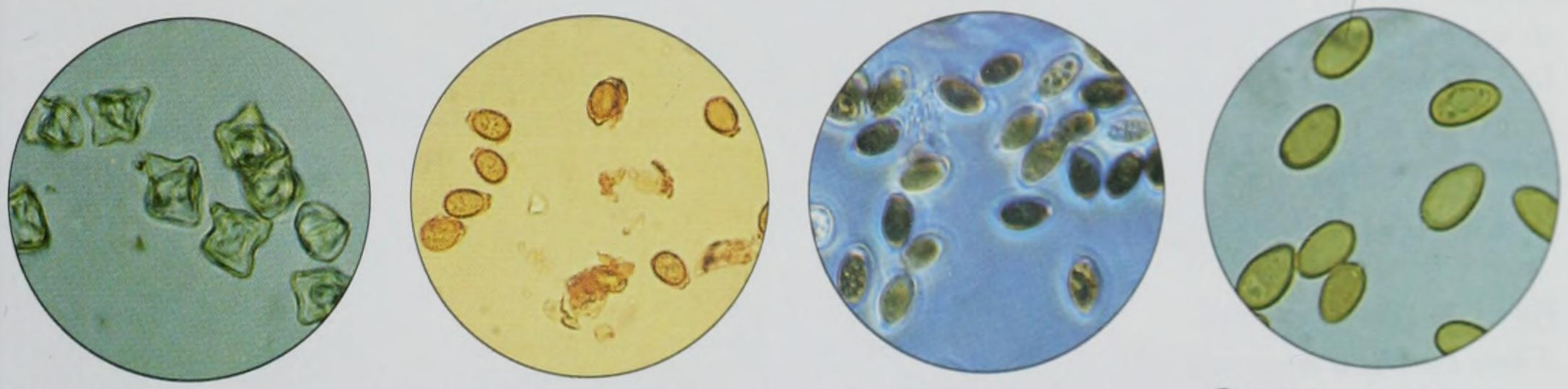
Rust-brown

Spore Shape and Size

Spore shape and size can be very important in the final correct identification of a species. Most spores are less than 20 microns (µm) long or wide (0.02mm), and many are smaller than 5µm, although some can be up to about 2mm in diameter. Their shape varies according to the method of their dispersal: actively discharged spores are typically asymmetrical, whereas those dispersed by passive means tend to be symmetrical. The spore chart on pp.284–88 gives spore shapes and average sizes, as well as other details, for species in this book.



◁ Microscope
To identify spore shapes and sizes, you will need a good quality, but not necessarily very expensive, microscope. Ideally, enlargement should be × 1000, but good results can be obtained at only × 400. A built-in light source is very useful.



Entoloma conferendum

Entoloma *species have angular spores. Those of* E. conferendum *are starlike in shape and many faceted.*

Ganoderma applanatum

G. applanatum *has rough-textured spores that are truncated at one end and have a double skin.*

Coprinus atramentarius

Like many Coprinus *species, the black spores of this species each have a tiny pore from which the hyphae germinate.*

Coniophora puteana

The ellipsoid spores of C. puteana *have a smooth surface and appear yellow-brown in color.*

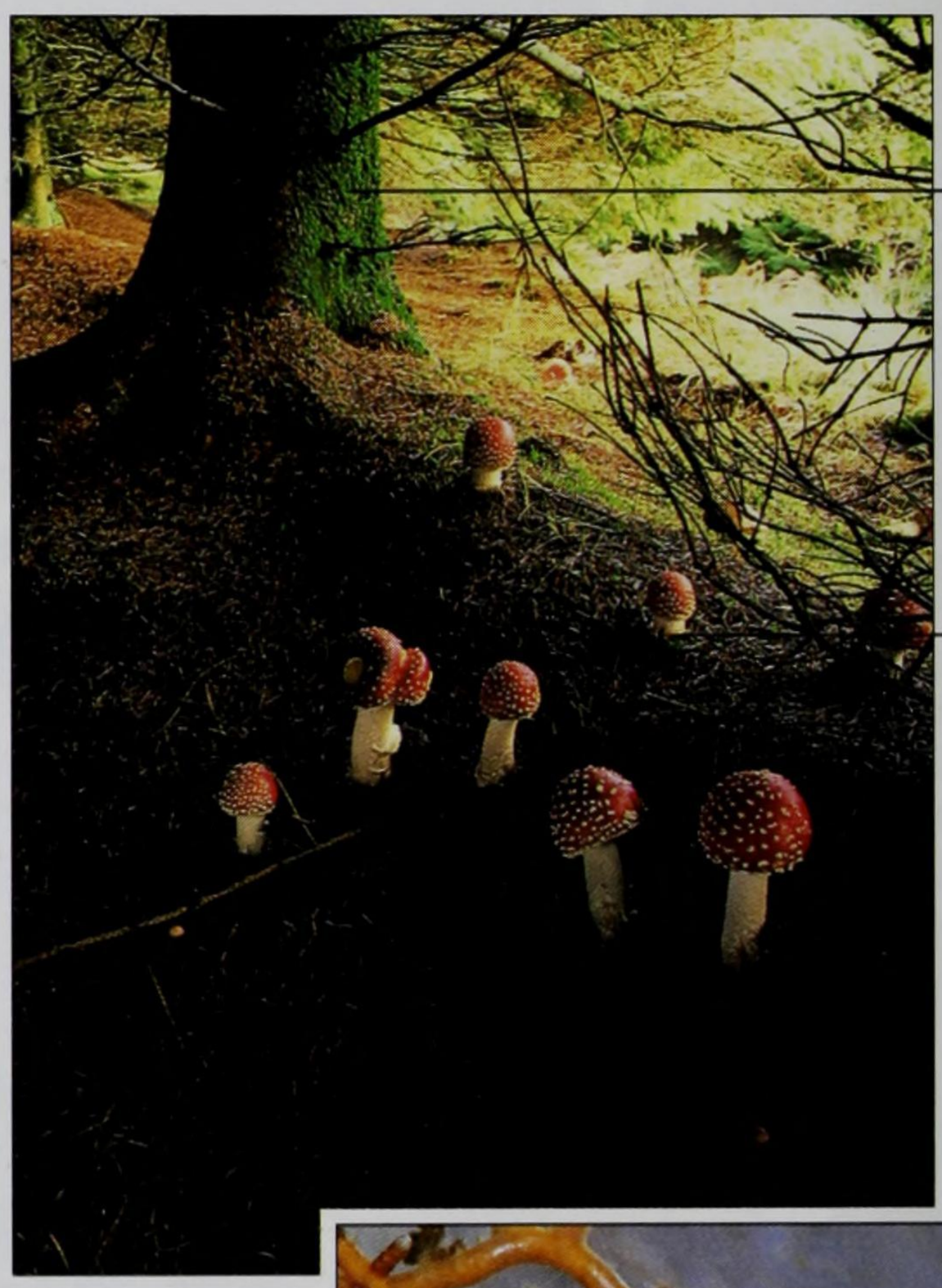
MUSHROOM LIFESTYLES

ONCE A MUSHROOM has established itself by forming a mycelium, it has to find a way to continue to grow and live. Different types of fungi have different methods of survival. Many have to form a mutally beneficial, or mycorrhizal, relationship with a living partner, such as a tree, which enables both to survive; others, known as saprotrophs, degrade (break down) dead material. There are also some fungi that kill plants or animals. These are called necrotrophs. Through their ability to break down dead matter or provide suitable growing conditions for other living things, fungi play a vital role in the ecological balance of the environment.

◁THE HOST TREE
A single tree species can provide different fungi with what they need to survive. The spruce, shown here, can support mycorrhizal fungi, saprotrophs can live off its litter, and necrotrophs may kill it and live off its remains.

MYCORRHIZAL

Mycorrhizae are the basis for a close beneficial relationship between the tree and the fungus, in which the tree gives the fungus sugars, while the fungus provides water and nutrients. A mycorrhizal relationship is formed when the hyphae of fungi species, including some agarics and most boletes, penetrate roots of a suitable living host tree.



SPECIAL RELATIONSHIP ▷
These fruitbodies of Amanita muscaria *(p.146) are near a spruce tree with which they may have formed mycorrhizae. Other trees, such as birch and oak, also form mycorrhizae with fungi.*

BELOW GROUND ▷
Where there is a mycorrhizal partnership, the fungus grows a mantle around the tiniest tree roots and a net of hyphae in between the outer root cells. Nutrients are exchanged between the partners via complex chemical pathways.

SAPROTROPHIC

With the aid of enzymes, which they release externally, saprotrophic fungi degrade many types of dead organic matter, including fungi and animals. Some saprotrophs, such as *Strobilurus esculentus* (right), occur only on one substrate, in this case a spruce cone. Others are wider in their range. Some fungal species are even present in a passive form in living plants, waiting to start their activity once the plant dies.

△ *STROBILURUS ESCULENTUS* (p.133)
This specialized saprotroph degrades only fallen spruce cones. It produces fruitbodies after obtaining the materials it needs from the substrate.

NECROTROPHIC

Necrotrophs, or parasites, live off of, and eventually kill living plants. Some kill their host by blocking or destroying the plant's water and nutrient systems with hyphae or specially produced, yeastlike cells; others use toxins. After killing the plant, the necrotroph acts like a saprotroph (see above), degrading the plant as a substrate. Parasitic fungi include *Fomes fomentarius* (p.219), and *Armillaria* species (pp.42 and 80).

△ *HETEROBASIDION ANNOSUM* (p.222)
This species causes extensive damage in large spruce stands, spreading from tree to tree via the roots. Following the death of the tree, the wood is degraded by the fungus and brackets are produced.

BIOTROPHIC

Like mycorrhizal fungi, biotrophic fungi, such as rusts and mildews, depend on a living host. However, in this case the plant does not benefit. Special hyphae are often produced by the fungus, which penetrate the host cells and transport the nutrients back to the fungus. Although the plant is not killed, its life processes may be affected. For example, spores may infect seeds and germinate in seedlings.

△ *LOPHODERMIUM PICEAE*
This tar-spot fungus produces black marks on spruce needles. Other Lophodermium *species may cause severe leaf fall on pines and other trees.*

Mushroom Habitats

Fungi occur throughout the world, but most of the species in this book can be found in the northern temperate zones. Some are widespread, occurring in North America, Europe, and Asia; others are restricted to a single continent or a very localized region within it. Most fungi are confined to a very specific environment, so it is important to be able to recognize the main habitats, including their indigenous plants, and which mushrooms occur in them.

Woodland

The many varieties of woodland support different types of fungal life. Alkaline loam dominated by ash trees tends to contain non-mycorrhizal species, such as *Lepiota*. Acidic, peaty soil, with beech or birch trees, has a high proportion of mycorrhizal fungi, such as boletes, trichs, and russulas. Mineral-laden soil, along paths or beside ditches, can support species of *Lepiota*, *Psathyrella*, and *Peziza*, which thrive on comparatively small amounts of organic matter.

△ Pine Woodland
Sandy pine woods are home to many boletes, such as Suillus bovinus *(p.200), as well as russulas (pp.120–29). Wetter, mossy pine forests are also rich in fungi.*

△ Suillus bovinus

◁ Oak Woodland
Mycorrhizal fungi and saprotrophs, such as Fistulina *species, occur with oak trees. Some of the same species are also found growing with chestnuts.*

◁ Fistulina hepatica

Coniferous Trees

Most coniferous trees, or conifers, form important mycorrhizal relationships with fungi. Many fungus species are found only under one particular type of conifer, so knowing the tree's name makes an accurate identification of the fungus more likely. The trees shown are among the most important.

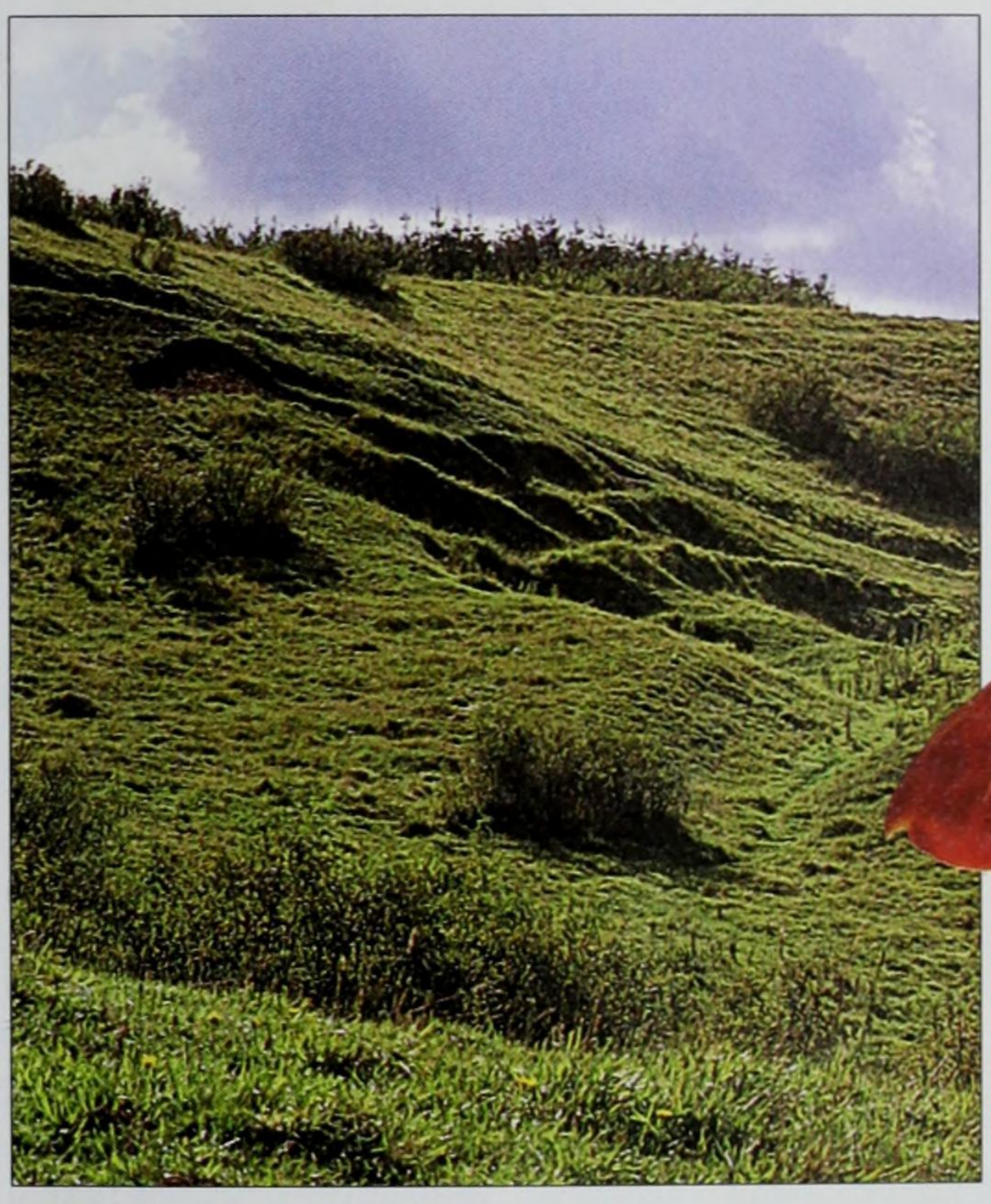
Larch (*Larix*)

Spruce (*Picea*)

Pine (*Pinus*)

GRASSLAND

There are many types of grassland, from the basic monocultures of wheat and barley to heavily fertilized pastures or near-natural, unfertilized but grazed or mown grassland. The mushrooms in such habitats may be directly associated with the grass or other plants in the turf, or they may be dung-fungi, living on the droppings of the animals that graze there. Soil composition is also important, with different fungi species occuring in very acidic grassland compared to more neutral or very alkaline soils.



△ FERTILIZED PASTURE
Typically grazed by farm animals, and with limited flora other than grass, fertilized pasture is a suitable habitat for many species of Agaricus, Coprinus, *and* Panaeolus, *which like dung-rich environments.*

△ AGARICUS CAMPESTRIS

◁ UNFERTILIZED MEADOW
This type of grassland is rich in plant and mushroom species. Dominant fungi include species of Clavaria, Entoloma, *and* Hygrocybe, *which do not thrive in fertilized pasture, possibly because they cannot compete with other fungi that flourish where nutrient levels are high.*

◁ HYGROCYBE PUNICEA

DECIDUOUS TREES

Mycorrhizal relationships often exist between fungi and deciduous trees shown here. There are several other important deciduous trees, including ash, elm, and maple, which have less direct relationships with fungi.

BIRCH (*BETULA*)

BEECH (*FAGUS*)

OAK (*QUERCUS*)

FORAGING FOR MUSHROOMS

WHEN LOOKING FOR FUNGI, remember to leave some fruitbodies in place so that they can mature, and, after your studies, throw leftovers on a compost heap or put them back in the woods. Check for maggots before gathering edibles.

FLAT BASKET

EQUIPMENT

A sharp knife and a basket or a compartmentalized collection box are essential equipment for foragers. Tweezers are helpful for handling tiny specimens, and a hand lens reveals small details. A camera and note pad are useful for documenting finds.

COLLECTION BOX WITH COMPARTMENTS

KNIFE

TWEEZERS

HAND LENS

CAMERA WITH MACRO LENS

NOTEPAD AND PENCILS

HOW TO PICK

Although most species can be gathered using a knife, shears, or a small pruning saw can be useful for collecting specimens on twigs or pieces of wood. Once picked, keep the fungi in closed containers so that important features are not lost and they do not dry out. Take a sniff when opening the container to detect diagnostic smells. Avoid picking poisonous or endangered species by making a preliminary attempt at identification before lifting specimens.

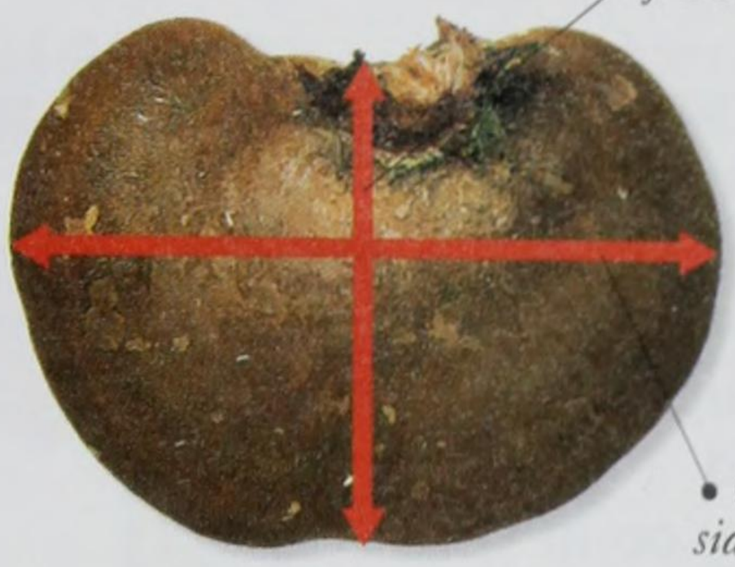
CUTTING WITH A KNIFE
When picking a mushroom, use a knife to lift out the stem base. Do not handle specimens more than absolutely necessary; this could damage or destroy useful identification characteristics.

THINGS TO NOTE

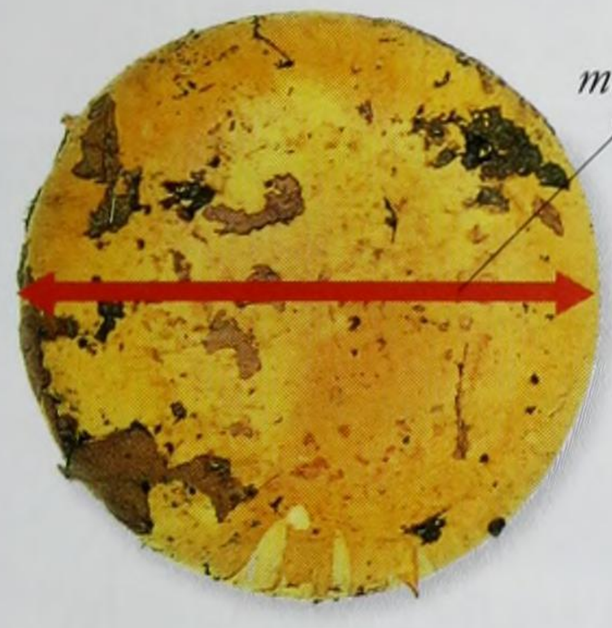
- **STAINING** Scratch with a finger nail to test for color changes.
- **TEXTURE** Rub the flesh between your fingers to check its texture.
- **SMELL** Check for any distinctive fragrance.
- **TASTE** Test only with a tiny piece and always spit the sample out.
- **CHEMICAL TESTS** Join a local mycology group to get help with chemical tests, which can be very useful in identification.

Taking Measurements

Standard measurements for different types of fungi are shown here. Although mushrooms vary in size, and can grow quite a bit before they are fully mature, it is useful to take measurements as an aid to identification. The dimensions given in the species descriptions are of average mature specimens.

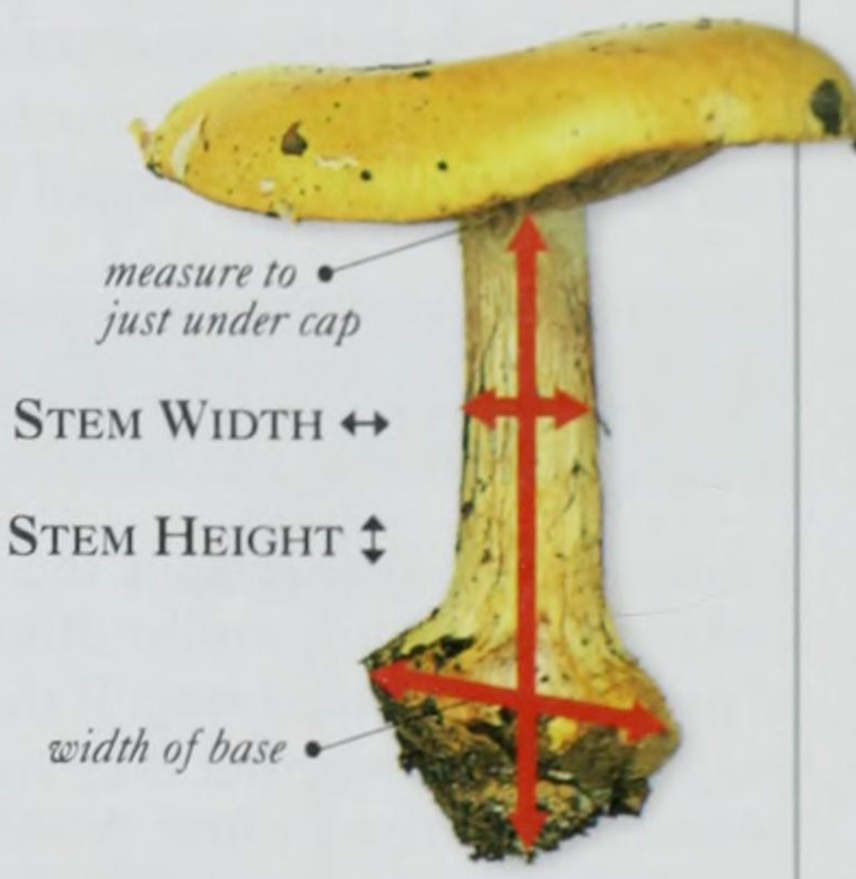


Bracket Width by Depth ⇿



Cap Diameter ⇿

Cap Height ↕



Poisonous or Edible?

Some poisonous mushrooms look similar to edible ones, so foragers are strongly advised to familiarize themselves with dangerous species. Never eat anything you cannot identify accurately. If you suspect poisoning, seek medical advice and take along a sample of the fungus. Of the fungi here, *Amanita pantherina* can be lethal; *Agaricus xanthoderma* and *Russula mairei* produce minor poisonings. **Note also:** *Amanita phalloides* p.151, *A. virosa* p.150, *Cortinarius rubellus* p.72, and *C. orellanus* p.73.

☠ *Amanita pantherina* p.149

🍽 *Amanita rubescens* p.147

☠ *Russula mairei* p.129

🍽 *Russula xerampelina* p.127

☠ *Agaricus xanthoderma* p.159

🍽 *Agaricus arvensis* p.158

IDENTIFICATION

TO IDENTIFY A MUSHROOM, use the keys on the following pages to find out what type it is and where it is most likely to be described in the species section. Answer the question (right), then follow the instructions and illustrations to the end. If at any point you become "stuck," start over again and double-check each characteristic. **Note:** Remember, never eat a mushroom unless you are absolutely certain of its identity.

DOES IT HAVE A CAP AND STEM?

YES

SEE BELOW ▽

NO

SEE PAGE 26 ▷▷

CAP AND STEM FUNGI: MAIN TYPES

Examine the cap, especially the underside, and choose the most similar illustration below to proceed to the next step. If the underside has gills, decide whether they are decurrent, adnexed to adnate, or free. A section will reveal this more clearly. If there are pores or spines instead (see p.15), choose a different illustration. Also check the stem is central. **Note:** the illustrations are for example only; your specimen could differ in color or shape.

With decurrent gills
SEE PAGE 25

With adnexed to adnate gills
SEE PAGE 25

With free gills
SEE PAGE 25

With stem off-center
SEE PAGE 178

With pores
SEE PAGE 25

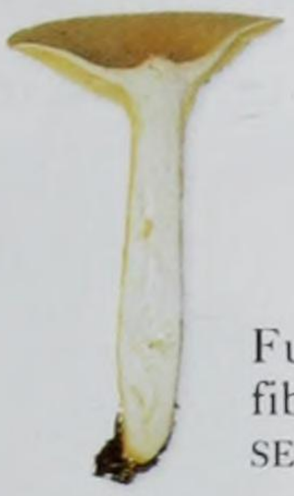
Honeycomb-, brain- or saddlelike cap
SEE PAGE 207

With spines
SEE PAGE 234

Cap and Stem Fungi: Other Characteristics

In this book, cap and stem fungi with gills or pores are divided into the subsections shown below. Choose the illustration and description that is closest to the fruitbodies you wish to identify, then turn to the page given. Be prepared to try again with any fruitbodies that fit more than one subsection. Spore color and size is often required to confirm identity.

Decurrent Gills



Funnel-shaped with fibrous flesh
SEE PAGE 28

With convex cap and fibrous flesh
SEE PAGE 37

Crumbly flesh exuding milk
SEE PAGE 43

Adnexed to Adnate Gills

Fleshy with no obvious veil
SEE PAGE 56

With cobweb-like veil
SEE PAGE 69

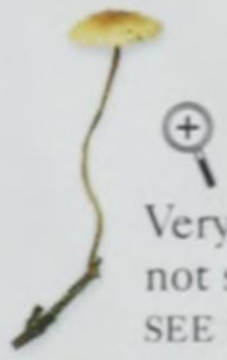
With stem ring or ring zone
SEE PAGE 78

With fibrous cap and dark spores
SEE PAGE 98

Medium-sized with smooth cap
SEE PAGE 103

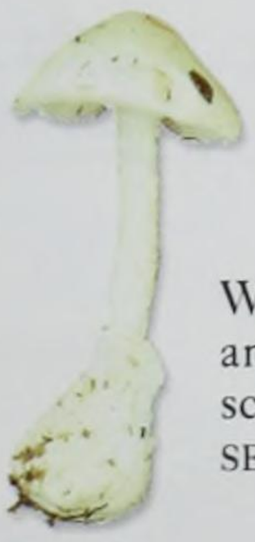
With crumbly flesh
SEE PAGE 120

Very small with smooth cap
SEE PAGE 132



Very small, cap not smooth
SEE PAGE 142

Free Gills

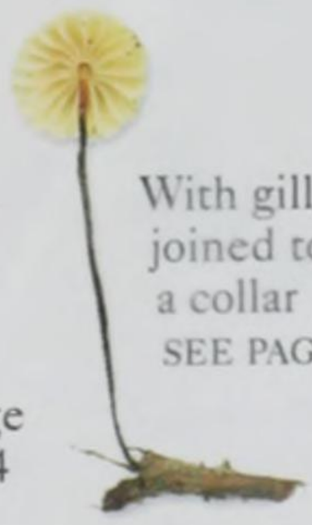


With volva and/or veil scales
SEE PAGE 145

With stem ring or ring zone
SEE PAGE 156

Without veil
SEE PAGE 171

Inky with age
SEE PAGE 174



With gills joined to a collar
SEE PAGE 177

With Pores

With soft flesh
SEE PAGE 184

With tough flesh
SEE PAGE 202

Other Fungi: Main Types

This part of the key features fungi that do not combine a cap and stem and are not, for the most part, the traditional mushroom shape. The best first clue to their identity is to decide on their shape and appearance, followed by other features such as texture or where they grow (see p.27). Compare your specimen with the shapes illustrated and choose the closest example, bearing in mind that there are many variations, some of which can be seen in the final part of the key on p.27. Do not expect to see the exact replica of what you have found illustrated here, and do not be put off by differences in color or details. Turn to the pages indicated to learn about variations in shapes and sizes within each section.

Bracket- or skinlike
SEE PAGE 27

Cap without stem
SEE PAGE 178

Club-shaped
SEE PAGE 27

Antler- to coral-like
SEE PAGE 248
Antler- to coral-like with spines
SEE PAGE 239

Rounded
SEE PAGE 27

Pear- to pestle-shaped
SEE PAGE 260

Cup- to disk-shaped
SEE PAGE 27

Trumpet-shaped
SEE PAGE 275

Star-shaped
SEE PAGE 277

Cagelike
SEE PAGE 277

Brain- or earlike
SEE PAGE 281

Other Fungi: Other Characteristics

In this book, the sections that contain a wide variety of forms are further subdivided. The subsections for fungi that are not the familiar cap and stem shape are illustrated below. Pick the illustration and description most similar to the fruitbodies you have found, then turn to the page given. It is helpful to use a hand lens to check whether the underside of a bracket is smooth or has thousands of minute pores. **Note:** The illustrations here are not to scale.

Bracket- or Skinlike

With pores
SEE PAGE 211

Wrinkled or smooth underneath
SEE PAGE 228

Skinlike, growing flat or crustlike
SEE PAGE 232

Club-shaped

Smooth or hairy
SEE PAGE 240

With pimples or a dusty surface
SEE PAGE 244

Phallus-shaped
SEE PAGE 246

Rounded

Above ground
SEE PAGE 253

Below ground
SEE PAGE 258

Cup- to Disk-shaped

Without "eggs"
SEE PAGE 264

Cup-shaped containing "eggs"
SEE PAGE 274

CAP & STEM FUNGI WITH DECURRENT GILLS

Mushrooms that have caps and stems, with gills under the caps, are called agarics. This section consists of agarics with "decurrent" gills – gills that run down the stem. Chanterelles are included in this section.

FUNNEL-SHAPED WITH FIBROUS FLESH

THIS SUBSECTION features agarics with funnel-shaped or depressed caps. They also have fibrous flesh, unlike the crumbly flesh of *Lactarius* species (see pp.43–55) or russulas (see pp.120–31). The combination of fibrous flesh and funnel-shaped caps can also be found in distantly related families.

Family CANTHARELLACEAE	Species *Cantharellus cibarius*	Season Summer–winter

COMMON CHANTERELLE

Widely varied in color, but often yellow with a hint of red, most forms of this species smell like dried apricots, and all make very good edibles. The cap is depressed in the center and often has a wavy margin; it has thick, decurrent, forked, gill-like veins. The pale cap flesh often bruises orange to red.

• **OCCURRENCE** Mycorrhizal with spruce and pine, also with deciduous trees, such as oak. Widespread in cold- and warm-temperate areas of the Northern Hemisphere; very common to rare.

• **SIMILAR SPECIES** *Hygrophoropsis aurantiaca* (p.29) is not mycorrhizal. *Omphalotus olearius* (p.29) has a luminous quality and grows on dead wood.

FRUITING In troops on well-drained soil.

△ *CANTHARELLUS SUBALBIDUS* This fleshy, off-white to cream species is found in the Pacific Northwest coastal woods. 🍽

Dimensions CAP ⟷ 2–12cm | STEM ↕ 2–10cm ↔ 0.4–1.5cm	Spores Pale cream	Edibility 🍽

Family PAXILLACEAE	Species *Omphalotus olearius*	Season Summer–autumn

JACK O'LANTERN

This bright orange species has gills that glow in the dark. It has a strongly depressed to funnel-shaped, shiny, smooth cap, a slightly paler stem, and firm, pale yellow flesh. It causes severe poisoning. Tropical and subtropical relatives of Jack O'Lantern also have a luminous quality.

• **OCCURRENCE** Found on dead or dying trees and stumps, often olive trees or oaks; causes white rot. Along with other closely related species, it is found mainly in southern parts of northern temperate zones and in the tropics.

• **SIMILAR SPECIES** The edible *Cantharellus* species (pp.28, 30, 275–76) are always mycorrhizal and have thick-edged, forked, veinlike "gills."

FRUITING In clusters on dead trees or buried roots.

Dimensions CAP ⟷ 6–14cm | STEM ↕ 6–15cm ↔ 0.8–2cm	Spores Off-white	Edibility

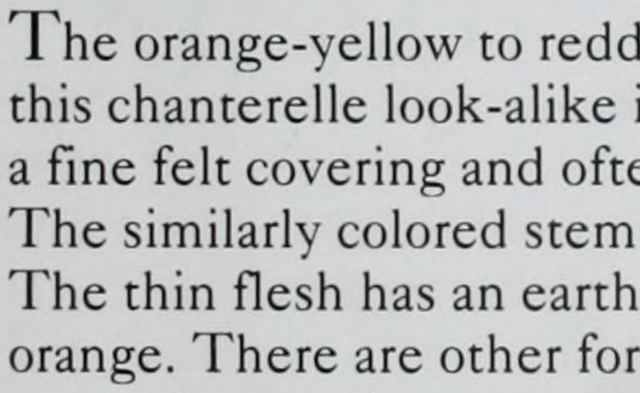
Family PAXILLACEAE	Species *Hygrophoropsis aurantiaca*	Season Summer–winter

FALSE CHANTERELLE

The orange-yellow to reddish orange cap of this chanterelle look-alike is convex to depressed with a fine felt covering and often with an incurved margin. The similarly colored stem becomes black with age. The thin flesh has an earthy smell and is white to pale orange. There are other forms: one is larger with brown cap scales; another has nearly white gills.

• **OCCURRENCE** Found growing among needle litter, rotten wood, or sawdust. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *Cantharellus cibarius* (p.28). *Omphalotus olearius* (above).



FRUITING A few together or in troops in woodland.

Dimensions CAP ⟷ 2–8cm | STEM ↕ 2–5cm ↔ 3–8mm	Spores Off-white	Edibility

Family CANTHARELLACEAE	Species *Cantharellus cinnabarinus*	Season Summer–autumn

CINNABAR CHANTERELLE

This very brightly colored species has a broadly convex cap that becomes funnel-shaped with a distinctly incurved and wavy margin as it matures. The cap emerges cinnabar-red and ages to pink-red. The pink to red stem is fairly short. The decurrent, pink, gill-like veins are forked with thick edges. The edible, fibrous flesh is fairly thin and red to off-white in the cap, thicker and white in the stem.

• **OCCURRENCE** Mycorrhizal, especially with oak trees, often appearing in moss. Widespread and common in eastern North America.

• **SIMILAR SPECIES** *Hygrocybe cantharellus* has comparatively sharp-edged, unforked gills.

cinnabar-red cap matures pink-red

cap surface is matted and fibrillose

convex cap ages to funnel-shaped

incurved, wavy cap margin

decurrent, thick-edged, forked "gills"

FRUITING Appears in large troops of conspicuous fruitbodies on soil along paths in woodland.

Dimensions CAP ⟷ 1–4cm | STEM ↕ 1.5–4cm ↔ 0.3–1cm	Spores Pinkish cream	Edibility

Family CANTHARELLACEAE	Species *Cantharellus tubaeformis*	Season Autumn–winter

TRUMPET CHANTERELLE

This species, when young, has a domed cap that becomes funnel-shaped with a wavy margin with age. The cap is in shades of brown; the stem is chrome-yellow, fading to dull yellow in mature specimens. It has gill-like veins. Its thin flesh tastes bitter but has an aromatic smell. The dull coloring makes it fairly difficult to find, but when discovered it is normally abundant, enabling large quantities to be gathered for eating.

• **OCCURRENCE** Mycorrhizal with both deciduous and coniferous trees, especially in older spruce forests. Widespread throughout northern temperate zones.

• **SIMILAR SPECIES** *Cantharellus lutescens* (p.275) lacks veins under cap.

wavy, irregular cap margin

funnel-shaped mature cap

more or less hollow stem

pale gray veins are decurrent

chrome-yellow stem fades to dull yellow

SECTION

cap occurs in shades of brown

FRUITING In large troops among mosses in woodland.

wrinkled and forked veins

Dimensions CAP ⟷ 1–6cm | STEM ↕ 3–8cm ↔ 3–8mm	Spores Cream	Edibility

Family TRICHOLOMATACEAE	Species *Lepista flaccida*	Season Summer–early winter

TAWNY FUNNEL CAP

The cap of this species is funnel-shaped, with an inrolled margin. It is tawny brown and may develop darker spots with age. Deeply decurrent gills run down the stem, which may be smooth or finely fibrillose. It is worthless as an edible.

• **OCCURRENCE** In woodland, especially near coniferous trees. Widespread and common in Europe; world distribution unknown.

• **SIMILAR SPECIES** Like most *Lepista* species, this mushroom is best distinguished from look-alikes, such as species of *Clitocybe* (pp.31, 33–34, 39–40) and *Tricholoma* (pp.59–64, 81), by microscopic features like its rough-walled spores. *Clitocybe gibba* (below) is less fleshy and has a paler spore deposit. *L. gilva* is more yellow with a margin that is distinctly spotted.

FRUITING In troops or fairy rings on woodland litter.

Dimensions CAP ⟷ 4–12cm | STEM ↕ 3–7cm ↔ 0.5–1cm	Spores Cream	Edibility

Family TRICHOLOMATACEAE	Species *Clitocybe gibba*	Season Late summer–late autumn

COMMON FUNNEL CAP

The cap of this species is pale leather-brown, with a pink tinge, and is markedly depressed in the center, sometimes with a small umbo. The stem is smooth and paler than the cap. The deeply decurrent gills are almost pure white. The Common Funnel Cap is edible but is not recommended because it can be confused with other members of the genus (see also SIMILAR SPECIES).

• **OCCURRENCE** Found in a very wide range of wooded habitats, from lowland to alpine. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *Lepista flaccida* (above). *L. gilva* is more fleshy and paler with a spotted cap margin.

FRUITING In troops on woodland litter.

Dimensions CAP ⟷ 3–8cm | STEM ↕ 2.5–6cm ↔ 0.5–1cm	Spores White-cream	Edibility

Family TRICHOLOMATACEAE	Species *Pseudoclitocybe cyathiformis*	Season Late autumn–early winter

GOBLET FUNNEL CAP

This very distinctive species has a strongly funnel-shaped cap, very dark coloration, and a tall stem. The cap dries from dark gray-brown to pale grayish leather-brown and has an inrolled margin. The flesh is aromatic and mild tasting; although edible, it is not recommended. The genus *Pseudoclitocybe* differs from *Clitocybe* (pp.31, 33–34, 39–40) in that the spores produce a blue reaction in iodine reagents (amyloid).

• **OCCURRENCE** In woodland and open areas, on litter in tall grass, or on very decayed trunks of deciduous trees. Widespread in northern temperate zones; quite common.

• **SIMILAR SPECIES** Other *Pseudoclitocybe* species, on the whole smaller and paler, are often found in more open habitats. *Omphalina* species (p.36) are smaller.

SECTION

FRUITING Singly or in troops in a range of habitats.

fairly crowded, grayish cream gills age to pale brown

Dimensions CAP ⇔ 3–7cm | STEM ↕ 6–10cm ↔ 0.5–1cm	Spores Cream-white	Edibility

Family TRICHOLOMATACEAE	Species *Leucopaxillus giganteus*	Season Late summer–autumn

GIANT FUNNEL CAP

A large, funnel-shaped cap that is flat when young is characteristic of this species. The cap, gills, flesh, and comparatively short stem are off-white to cream. The spores turn blue in the presence of reagents containing iodine (amyloid) – a trait shared by all *Leucopaxillus* species. It can often cause stomach upsets.

• **OCCURRENCE** Borne from mycelia that may be hundreds of years old. The fruitbodies are found in grassland and also in parks and open woodland areas. Widespread in Europe; world distribution is poorly understood.

• **SIMILAR SPECIES** *Clitocybe geotropa* (p.33) has a longer stem.

FRUITING Appears in fairy rings, which may be huge, mostly on nutrient-rich grassland.

Dimensions CAP ⇔ 12–40cm | STEM ↕ 4–8cm ↔ 2–4cm	Spores Whitish cream	Edibility

Family TRICHOLOMATACEAE	Species *Clitocybe geotropa*	Season Autumn–early winter

STOUT-STALKED FUNNEL CAP

A funnel-shaped, fairly fleshy cap with a central umbo on a tall stem, pale leather-brown coloring, and a tendency to grow in fairy rings is typical of a closely related group of North American species. The genus *Clitocybe* is ridden with identification problems.

• **OCCURRENCE** Occurs mostly in woodland. In some parts it is found growing under deciduous trees, but it also thrives in certain types of coniferous woodland. Widespread and common in Europe, although not in cooler regions; worldwide distribution is poorly understood.

• **SIMILAR SPECIES** *Clitocybe nebularis* (p.40), often found in similar woodland habitats, is much grayer and has a bun-shaped cap. *Leucopaxillus giganteus* (p.32) has a shorter stem and fruits mostly in nutrient-rich grassland.

FRUITING Often in fairy rings on woodland litter.

Dimensions CAP ⟷ 5–20cm | STEM ↕ 8–20cm ↔ 1–3cm	Spores White	Edibility

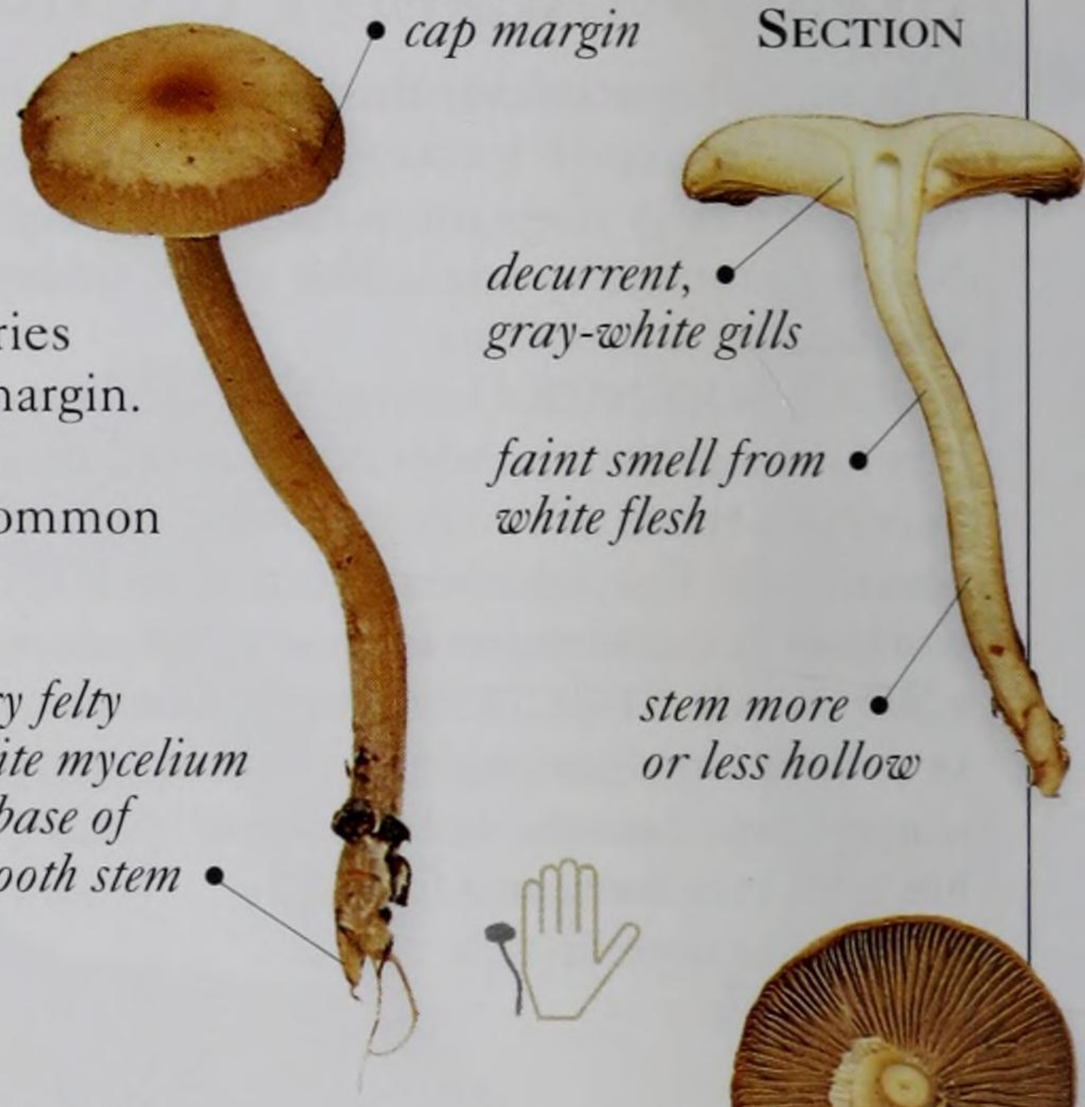
Family TRICHOLOMATACEAE	Species *Clitocybe metachroa*	Season Autumn–winter

GRAY-BROWN FUNNEL CAP

Like many small members of this genus, this pale gray-brown species is difficult to identify with certainty. A very indistinct smell, which is not yeasty like many *Clitocybe* species, is perhaps its clearest characteristic. The flattened to deeply depressed cap dries with age, remaining darker at the center with a striate margin.

• **OCCURRENCE** Found growing among tree litter in deciduous and coniferous woodland. Widespread and common throughout Europe; worldwide distribution not known.

• **SIMILAR SPECIES** *Clitocybe vibecina* has a strong, rancid-yeast smell and taste.



FRUITING In troops on poor and more fertile soil.

Dimensions CAP ⊕ 2.5–6cm | STEM ↕ 3–6cm ↔ 3–7mm	Spores Off-white	Edibility

Family TRICHOLOMATACEAE	Species *Clitocybe dealbata*	Season Summer–autumn

POISON LAWN FUNNEL CAP

This is a highly poisonous mushroom, sometimes classed as two species: *Clitocybe rivulosa*, which has brown coloring, and *C. dealbata*, which is almost pure white. The convex to funnel-shaped cap has a mealy surface, often with dark spots in concentric rings; it cracks and dries even paler. The stem is off-white to pale brown. The white to buff-brown flesh has a somewhat yeasty smell.

• **OCCURRENCE** In grassy areas, including parks, lawns, and sports fields; may be found growing with the edible *Marasmius oreades* (p.117), which is distinguished by its adnexed to almost free gills and rubbery stem. Widespread in northern temperate zones.

FRUITING Often in fairy rings among grasses.

Dimensions CAP ⊕ 2–6cm | STEM ↕ 1.5–4cm ↔ 3–6mm	Spores White	Edibility

Family PAXILLACEAE	Species *Paxillus involutus*	Season Summer–autumn

POISON PAX

A strongly inrolled, yellow- to red-brown cap, with a downy margin and slightly depressed center, are particularly clear indicators of this very common poisonous species. So are the soft, crowded yellow gills that stain brown where touched and are removable with a knife tip. Colored like the cap, the stem is short and felty; the flesh is pale yellow to pale brown and darkens on cutting.

• **OCCURRENCE** Mycorrhizal mostly with coniferous trees and birch, in woodland, parks, and gardens. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *Paxillus filamentosus* has a less incurved margin, yellow flesh, and occurs under alder.

FRUITING In troops, rings, or a few together under trees.

Dimensions CAP ⇔ 6–15cm | STEM ↕ 4–8cm ↔ 1–2cm	Spores Yellowish brown	Edibility ☠

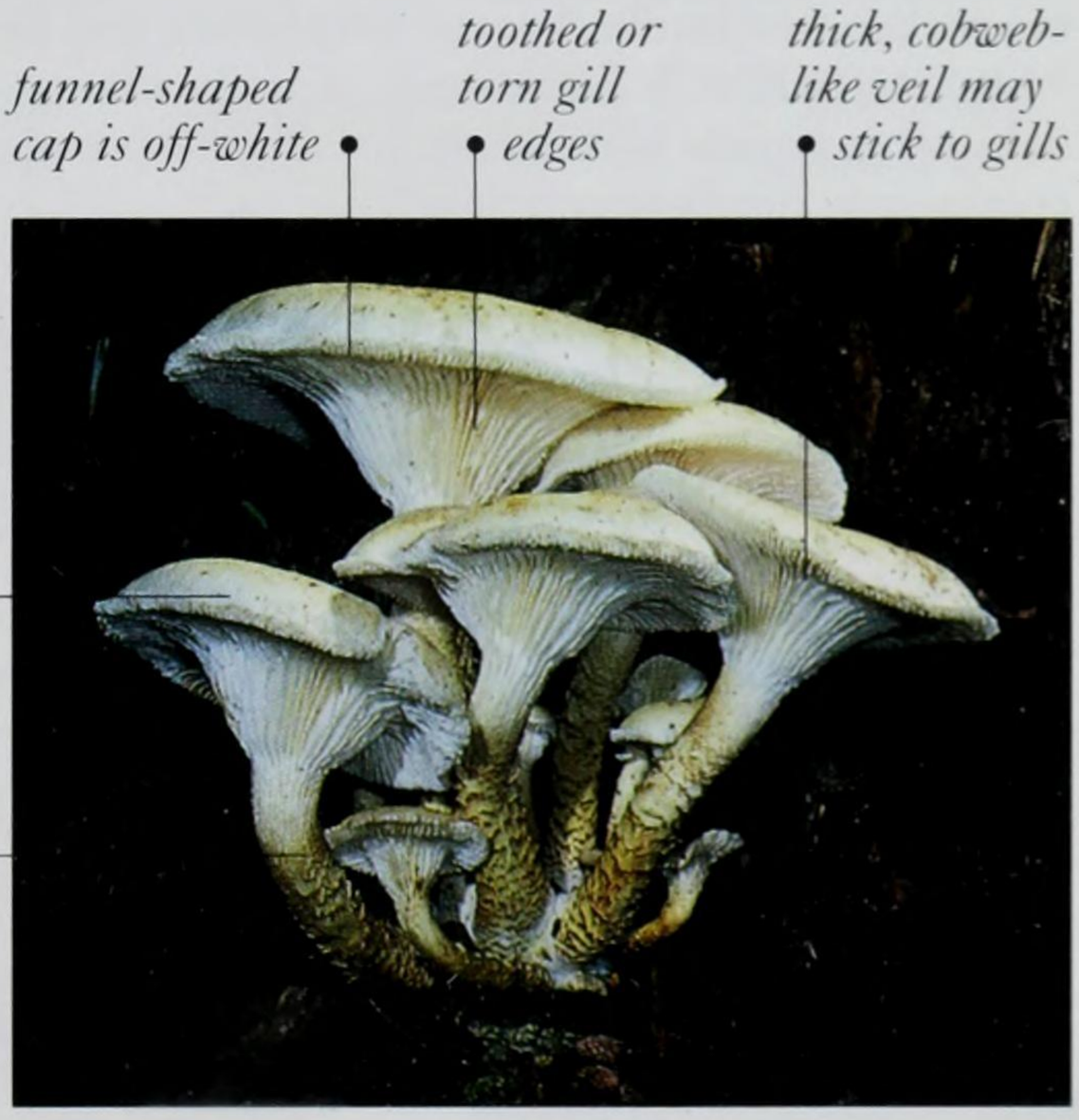
Family POLYPORACEAE	Species *Lentinus tigrinus*	Season Summer–autumn

TIGER LENTINUS

The funnel-shaped, off-white cap of this species has brown scales at the center and an incurved margin; the stem is also off-white, with brown scales that may appear to be stripes. The off-white gills are tough and decurrent. In one form the veil over the gills fails to open, making it look like it is parasitized by a mold.

• **OCCURRENCE** On deciduous trees, where it causes a white rot. Widespread and common in Europe and also in eastern North America.

• **SIMILAR SPECIES** *Lentinus lepideus* typically appears singly or in small clusters on conifers and produces a crumbly brown rot.



FRUITING In clusters on old branches or logs, particularly of poplar and willow, often near water.

Dimensions CAP ⇔ 1–10cm | STEM ↕ 1.5–7.5cm ↔ 0.5–1cm	Spores White	Edibility 🍽

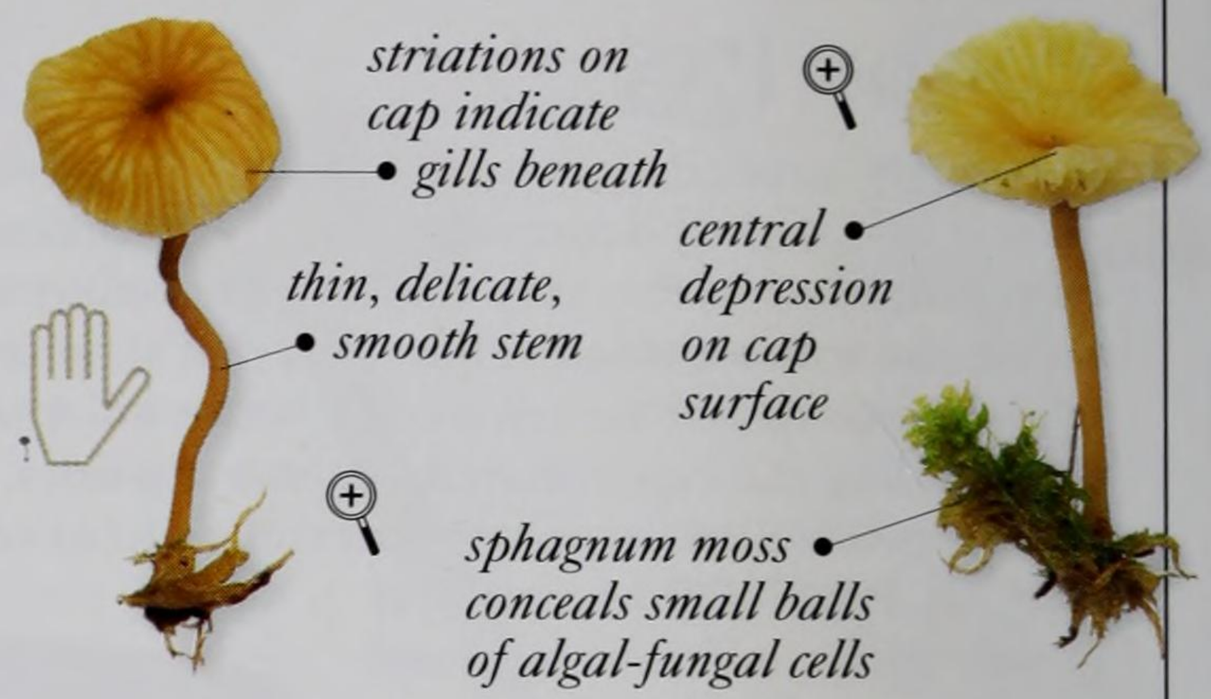
Family TRICHOLOMATACEAE	Species *Omphalina ericetorum*	Season Spring–late autumn

LICHEN AGARIC

The yellow-brown cap of this small species has a central depression and radial striations, each one representing a gill beneath. The thin stem is smooth and is also yellow-brown, with a violet-gray tinge at the top. The flesh is very thin and off-white to ocher.

• **OCCURRENCE** This species is also a lichen, *Botrydina vulgaris*, living with an algal partner. The energy produced by the algae through photosynthesis enables it to colonize harsh acidic environments. It is found on turf or sphagnum moss, often at higher altitudes but also in lowlands. Widespread in cooler regions of northern temperate zones; widely distributed across northern North America.

• **SIMILAR SPECIES** *Omphalina alpina*, found growing in alpine and arctic areas, is a brighter yellow color.



FRUITING Appears singly or a few together.

Dimensions CAP ⟷ 0.5–1.5cm | STEM ↕ 1–2cm ↔ 1–2mm	Spores White	Edibility

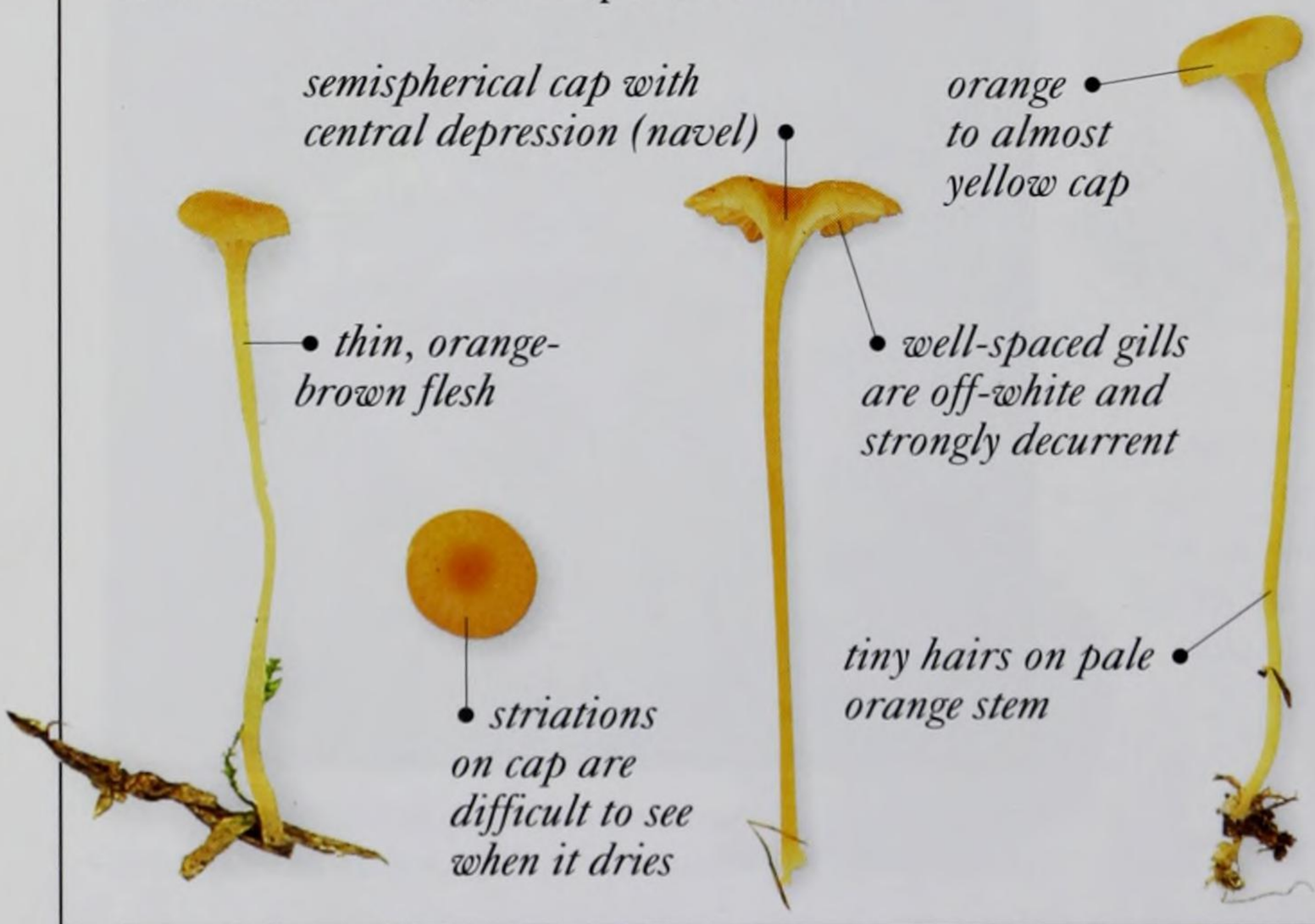
Family TRICHOLOMATACEAE	Species *Rickenella fibula*	Season Summer–autumn

ORANGE MOSS AGARIC

Orange to pale yellow in color, this species is tiny, with a semi-spherical cap that is centrally depressed and has radial striations that fade as it dries. The stem is long and thin, and the gills are strongly decurrent. A hand lens reveals fine hairs all over the fruitbody. This and *Rickenella setipes* (inset, right) are the two most common species in the genus. *Rickenella* species have been classified under *Mycena*, *Omphalina*, and *Gerronema*.

• **OCCURRENCE** Parasitic on moss in a range of grassy habitats; a typical lawn mushroom. Widespread and common in northern temperate zones.

△ ***RICKENELLA SETIPES***
This tiny species is pale gray to gray-brown; the cap center (navel) is almost black. The top of the stem is tinged dark violet.



FRUITING Singly or in small groups or troops.

Dimensions CAP ⟷ 0.3–1cm | STEM ↕ 3–5cm ↔ 1–2mm	Spores White	Edibility

WITH CONVEX CAP AND FIBROUS FLESH

THE SPECIES here have semi-spherical, convex, or umbonate caps and fibrous flesh. Unlike the species on pp.28–36, the caps very rarely develop a central depression. Those on pp.43–55 may have caps of a similar shape, but they are distinguished by their crumbly, cheeselike flesh.

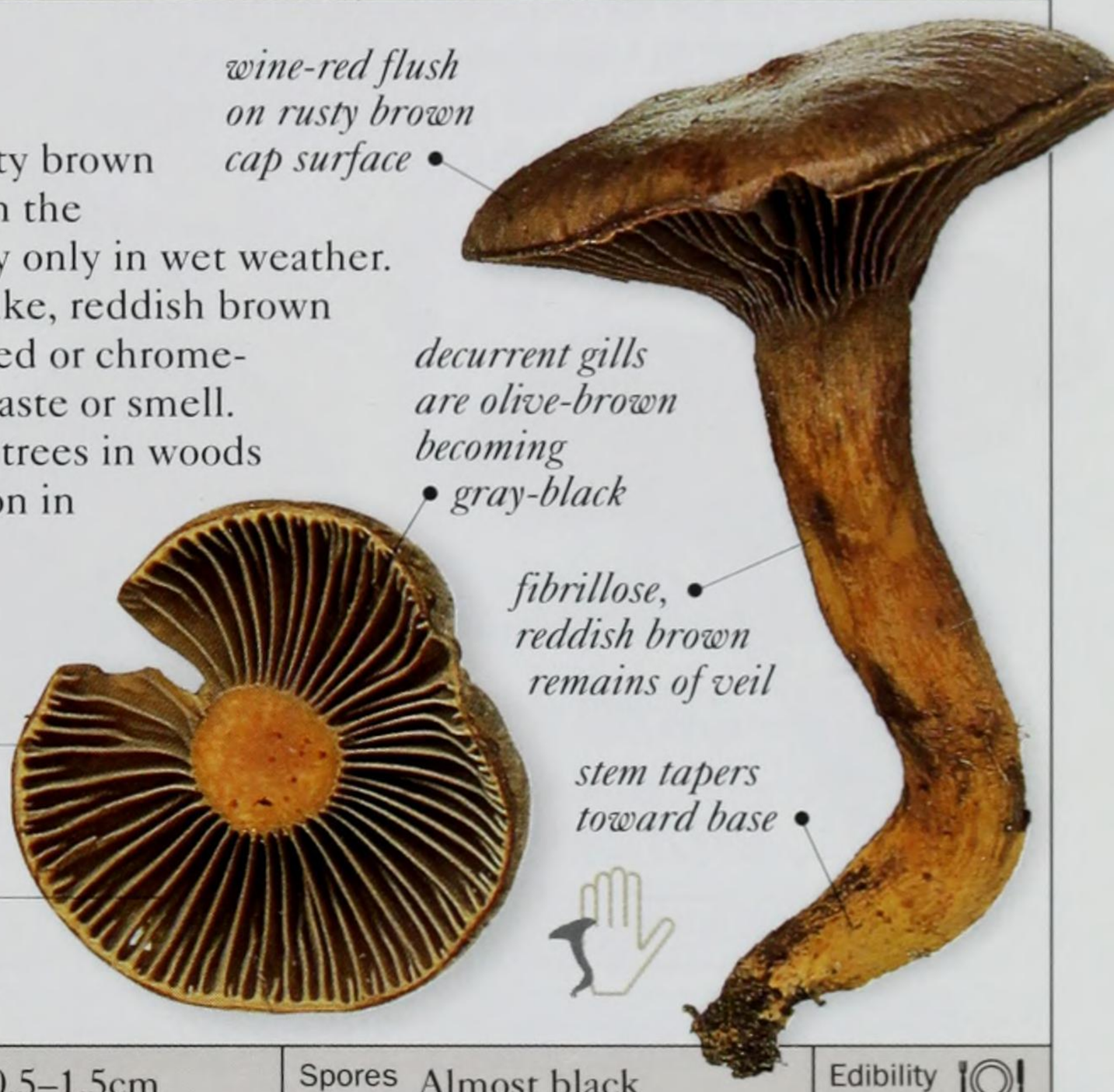
Family GOMPHIDIACEAE	Species *Chroogomphus rutilus*	Season Autumn

PINE GOMPH

This agaric has a convex or umbonate, rusty brown cap with a wine-red flush; unlike species in the related *Gomphidius* genus (p.38), it is greasy only in wet weather. The rust-orange stem has zones of threadlike, reddish brown veil remains. The flesh is orange to wine-red or chrome-yellow at the stem base; it has no distinct taste or smell.

• **OCCURRENCE** Mycorrhizal with pine trees in woods and stands. Widespread and locally common in northern temperate zones.

FRUITING In small groups or troops on sandy soil.



Dimensions CAP ⊕ 4–8cm | STEM ↕ 4–12cm ↔ 0.5–1.5cm	Spores Almost black	Edibility

Family HYGROPHORACEAE	Species *Hygrophorus hypothejus*	Season Late autumn–early winter

LATE FALL WAX CAP

This late-fruiting species has a convex to funnel-shaped, slimy, brown to olive-brown cap, a slimy stem, and decurrent yellow gills. An orange form, known as *Hygrophorus aureus*, is occasionally found.

• **OCCURRENCE** Mycorrhizal with pine trees, preferring sandy soil; typically found following the first frosts. Widespread in northern temperate zones; locally common.

• **SIMILAR SPECIES** *H. lucorum* is bright yellow and is associated with larch. Several other *Hygrophorus* species that are also found with pine are all distinguished from *H. hypothejus* by their different coloring.

FRUITING In small groups among mosses and lichens.

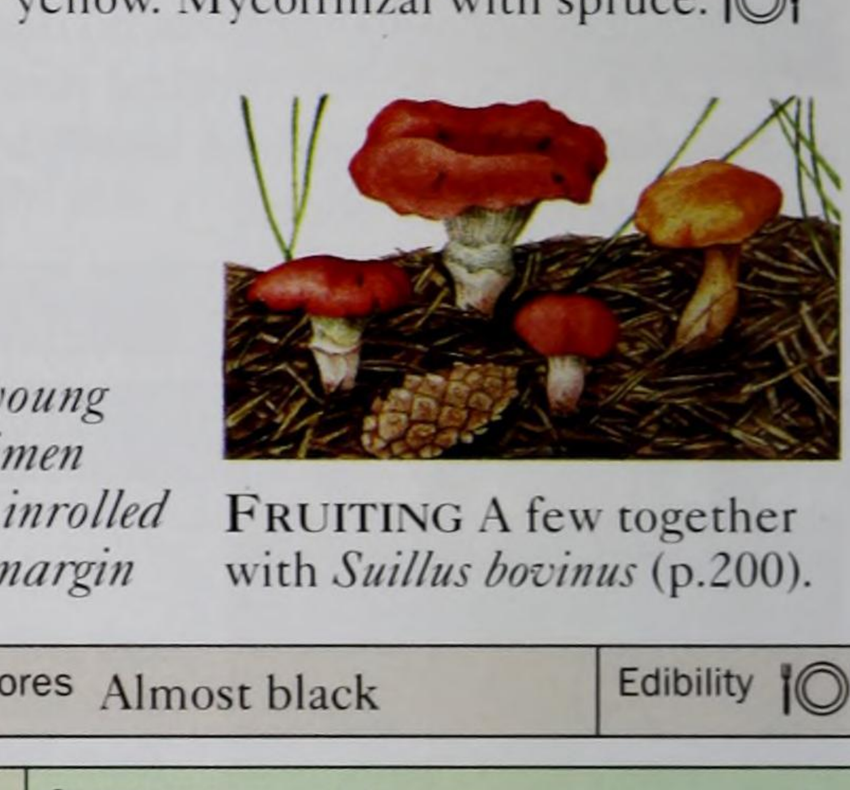
Dimensions CAP ⊕ 3–5cm | STEM ↕ 4–7cm ↔ 0.5–1cm	Spores White	Edibility

Family GOMPHIDIACEAE	Species *Gomphidius roseus*	Season Late summer–autumn

ROSY GOMPH

This unmistakable species has a coral-red cap that is convex with an inrolled margin when young, becoming flattened with age. The stem is spindle-shaped and bears the remains of the slimy, colorless veil, which is often stained black by the falling spores. The flesh is off-white with a coral-red tint and has no distinctive smell or taste. It is edible but not recommended, due to its rarity.

• **OCCURRENCE** Under pine trees on sandy soil, among mosses, lichens, and pine litter. Widespread in northern temperate zones.



△ *GOMPHIDIUS GLUTINOSUS*
This gray-brown species is covered in a colorless, slimy veil. The stem has an indistinct ring zone, often stained black by spores, and its base is lemon-yellow. Mycorrhizal with spruce.

FRUITING A few together with *Suillus bovinus* (p.200).

Dimensions CAP ⇔ 1.5–5cm | STEM ↕ 2–4cm ↔ 0.5–1cm	Spores Almost black	Edibility

Family HYGROPHORACEAE	Species *Hygrocybe pratensis*	Season Throughout autumn

BUFF WAX CAP

This orange species has a fleshy, dry to greasy, convex cap that flattens with age. It has a wavy margin and sometimes a central umbo. The faintly striated stem is paler than the cap and may taper toward the base. A popular edible, with fairly solid, buff flesh, it has an earthy smell and pleasant taste. Along with *Hygrocybe virginea* (p.39), it is often classified in the genera *Camarophyllus* or *Cuphophyllus*.

• **OCCURRENCE** Found in unimproved grassland, rarely in damp woodland. Widespread and fairly common in northern temperate zones.

• **SIMILAR SPECIES** *Hygrophorus nemoreus* has a dry cap and grows in oak woods.

FRUITING In groups or rings with moss and grass.

Dimensions CAP ⇔ 2.5–6cm | STEM ↕ 2.5–6cm ↔ 0.5–1.5cm	Spores White	Edibility

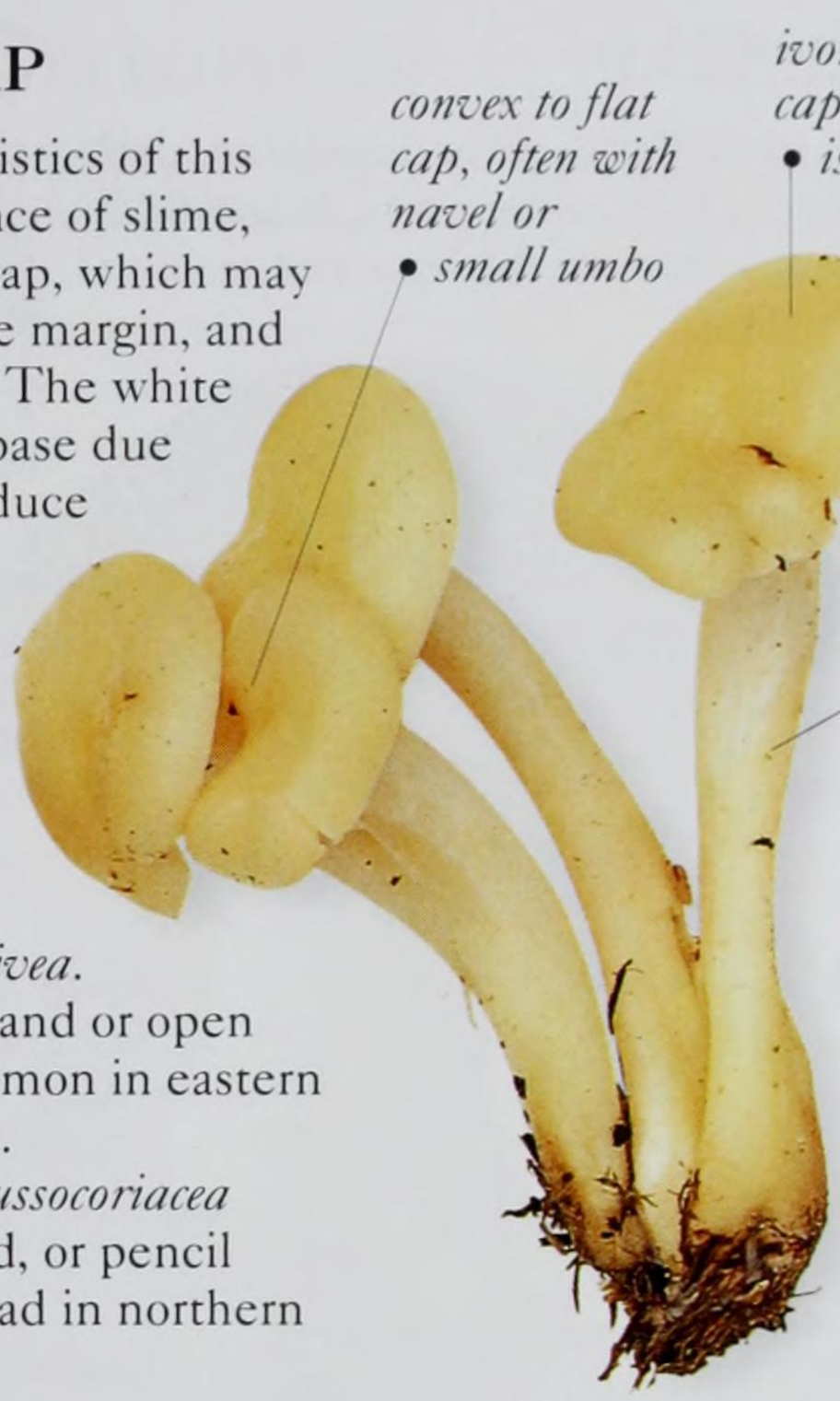
Family HYGROPHORACEAE	Species *Hygrocybe virginea*	Season Autumn

SNOWY WAX CAP

The most obvious characteristics of this variable species are an absence of slime, a dry to greasy, ivory-white cap, which may be translucently striate at the margin, and well-spaced, decurrent gills. The white stem sometimes has a pink base due to an infection that may produce a smell of coconut. Two varieties occur: var. *fuscescens* has a yellow-ocher to brown cap center; var. *ochraceopallida* has a pale leather-brown cap. Slimy-capped specimens are sometimes classified as *H. nivea*.

• **OCCURRENCE** In grassland or open woods. Widespread and common in eastern and northern North America.

• **SIMILAR SPECIES** *H. russocoriacea* smells of leather, sandalwood, or pencil shavings. It is also widespread in northern temperate zones.



SECTION

FRUITING Found in troops or fairy rings among grass.

Dimensions CAP ⊕ 1.5–5cm | STEM ↕ 2–7cm ↔ 0.3–1cm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Clitocybe odora*	Season Summer–autumn

ANISE FUNNEL CAP

The convex or umbonate cap of this species matures from blue-green to gray or gray-brown; it is rarely funnel-shaped. The adnate or only slightly decurrent gills are unusual in this genus, but the strong anise smell of the marbled flesh is common to a number of *Clitocybe* species. It is edible, but see SIMILAR SPECIES.

• **OCCURRENCE** Among deciduous or coniferous litter in woodlands. Widespread in northern temperate zones.

• **SIMILAR SPECIES** A number of species that smell similar, including *C. fragrans*, are typically smaller, white or leather-brown, and have decurrent gills. They are not edible.

SECTION

FRUITING In troops on soil; it prefers fertile soil.

Dimensions CAP ⊕ 3–6cm | STEM ↕ 3–6cm ↔ 0.4–1cm	Spores Dull pink	Edibility

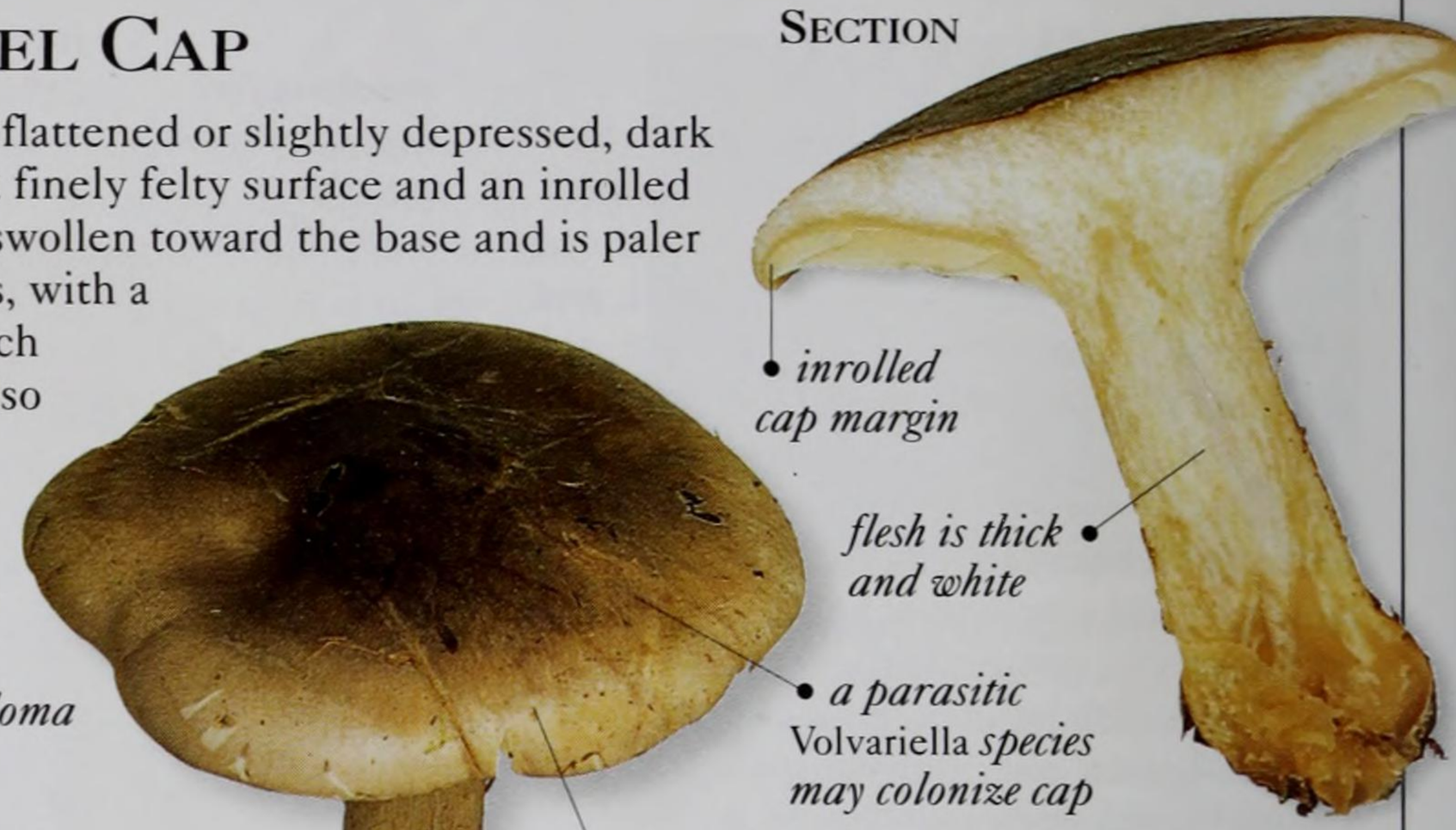
Family TRICHOLOMATACEAE	Species *Clitocybe nebularis*	Season Autumn–early winter

CLOUDED FUNNEL CAP

This species has a convex to flattened or slightly depressed, dark gray-brown to gray cap with a finely felty surface and an inrolled margin. The stem is slightly swollen toward the base and is paler than the cap. A fleshy species, with a strong aroma, it causes stomach upsets in many people; see also SIMILAR SPECIES.

• **OCCURRENCE** In a range of wooded habitats. Widespread; mostly common in northern temperate zones.

• **SIMILAR SPECIES** *Entoloma sinuatum* (p.68) is poisonous.



FRUITING Typically forms fairy rings on fertile soil.

Dimensions CAP ⇹ 8–20cm | STEM ↕ 5–10cm ↔ 1.5–4cm	Spores Cream	Edibility

Family TRICHOLOMATACEAE	Species *Clitocybe clavipes*	Season Late summer–autumn

ALCOHOL FUNNEL CAP

This species is identified by its club-shaped stem, which is swollen at the base and tapering toward the top, and by its fairly large size and soft, cream-colored gills. The cap is almost flat and feels greasy; it is gray-brown, often with a clear, pale margin. The white to cream flesh has a strong, sweet smell and is soft and spongy; the fruitbody can hold large amounts of water. When consumed with alcohol, this mushroom causes illness.

• **OCCURRENCE** Mostly under conifers, but also in deciduous woodland, typically under birch trees. Widespread and common in northern temperate zones.

FRUITING In small groups on humus-rich, acidic soil.

Dimensions CAP ⇹ 4–8cm | STEM ↕ 3–10cm ↔ to 1.5cm	Spores White	Edibility

Family ENTOLOMATACEAE	Species *Clitopilus prunulus*	Season Autumn

BREAD DOUGH CLITOPILUS

A pale gray-white cap and decurrent, pale pink gills, combined with a strong smell of fresh bread dough, distinguish this species. The cap is convex to funnel-shaped; the stem is central or off-center and is similar in color to the cap. This species is a choice edible, but see also SIMILAR SPECIES.

• **OCCURRENCE** In mostly acidic woodland; also found growing in open, grassy places, but close to trees. Widespread and rather common in northern temperate zones.

• **SIMILAR SPECIES** Species of *Clitocybe* and *Entoloma* can look very similar and are poisonous.

FRUITING A few or in troops on humus-rich soil.

Dimensions CAP ⟷ 3–9cm | STEM ↕ 2–6cm ↔ 0.4–1cm	Spores Pale pink	Edibility

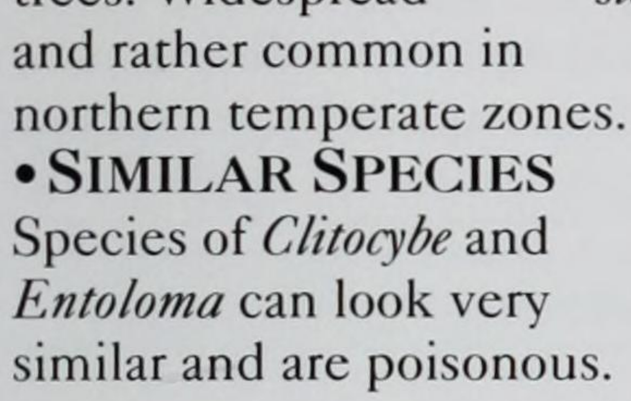
Family TRICHOLOMATACEAE	Species *Lyophyllum decastes*	Season Autumn, mostly late

SHIMEJI FUNNEL CAP

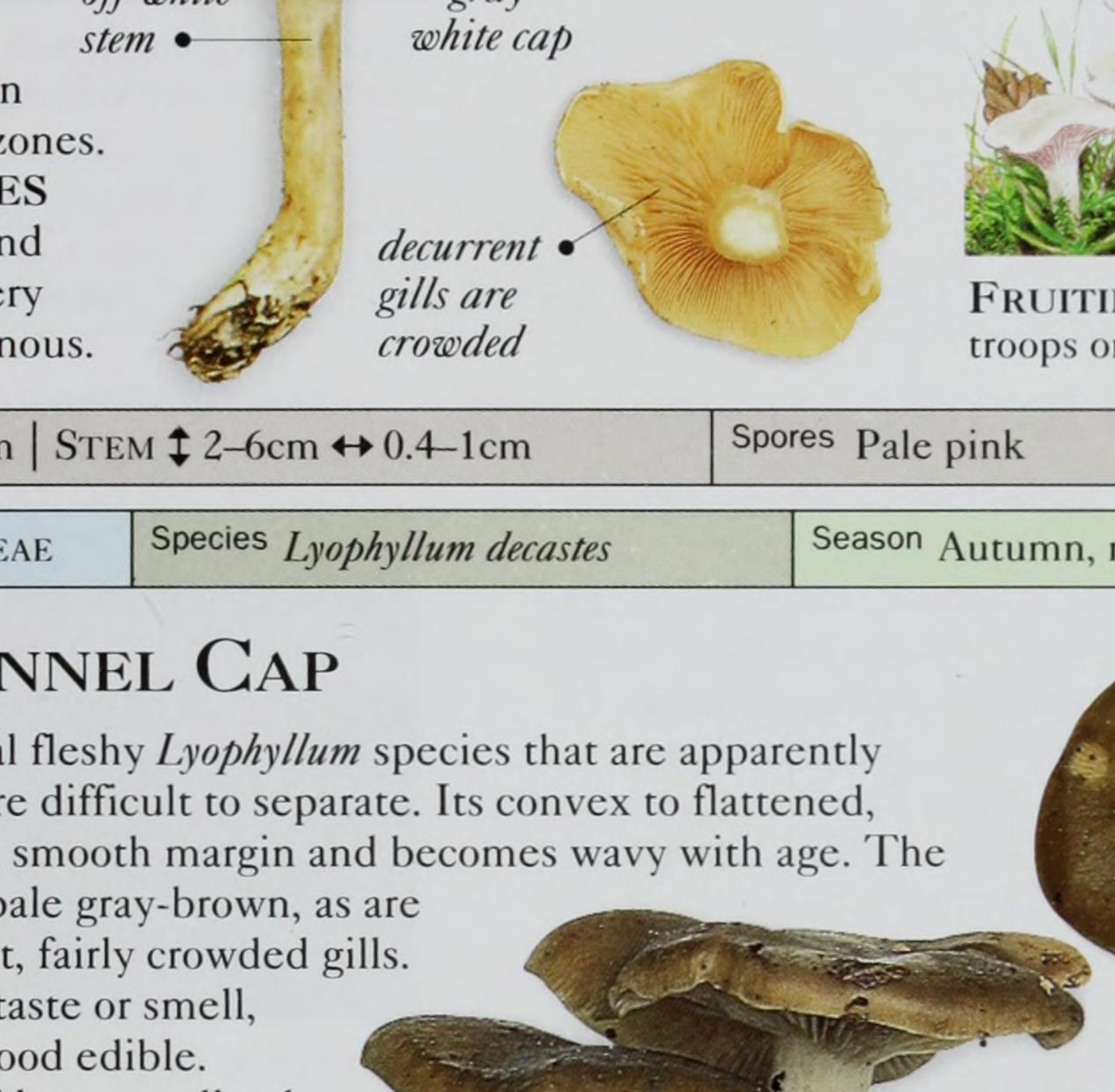
This is one of several fleshy *Lyophyllum* species that are apparently closely related and are difficult to separate. Its convex to flattened, gray-brown cap has a smooth margin and becomes wavy with age. The stem is off-white or pale gray-brown, as are the slightly decurrent, fairly crowded gills. It has no distinctive taste or smell, but is considered a good edible.

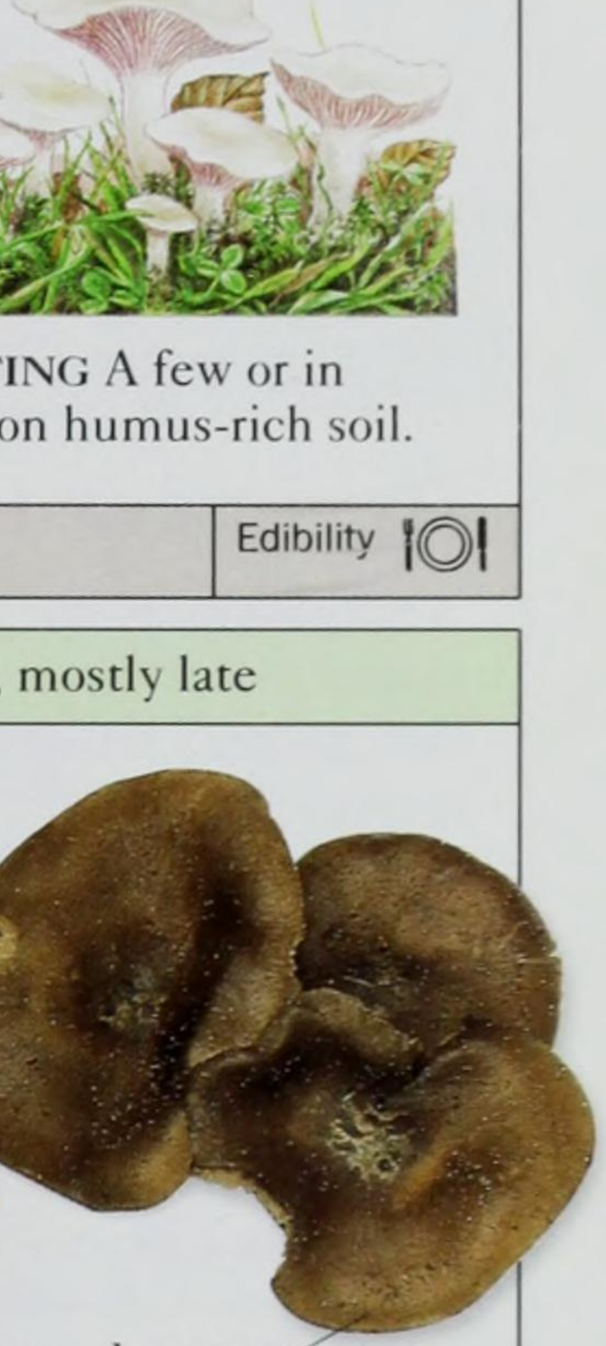
• **OCCURRENCE** Along woodland paths and in gardens and parks, but not in direct association with trees. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *L. fumosum* has a stem fused into a trunklike base.



FRUITING Often in dense clusters with fused stems.





Dimensions CAP ⟷ 5–10cm | STEM ↕ 4–10cm ↔ 0.5–2.5cm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Lyophyllum connatum*	Season Autumn

POISON ROADSIDE FUNNEL CAP

The cap of this white mushroom is convex, often with a wavy margin, and the stem tapers toward the base. The rather crowded, white to pale gray gills are slightly decurrent; they stain violet when in contact with solid or dissolved ferrous sulfate ($FeSO_4$). The flesh is white and also stains violet.

• **OCCURRENCE** Mostly on disturbed soil on woodland edges. Widespread in northern temperate zones, including alpine areas.

• **SIMILAR SPECIES** Some of the white *Clitocybe* species are fairly similar in appearance. They are distinguished by their failure to stain violet.

convex cap with wavy margin

decurrent, pale gray to white gills

FRUITING Singly or in clusters of fruitbodies on road edges in woodlands.

Dimensions CAP ⊕ 3–10cm | STEM ↕ 5–12cm ↔ 0.5–1.5cm	Spores White	Edibility ☠

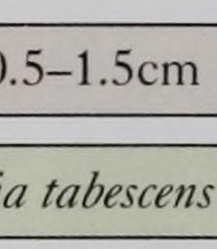
Family TRICHOLOMATACEAE	Species *Armillaria tabescens*	Season Autumn

RINGLESS HONEY MUSHROOM

The convex to flat or depressed, dry, yellowish brown cap of this species has erect brown scales at the center. The stem is fibrous and off-white and is often fused with many others at its base. Black mycelial strands are present on the substrate. Its off-white flesh is edible after careful cooking.

• **OCCURRENCE** Attached to roots or near trees. Rare in warmer parts of Europe but widespread and common in eastern North America.

• **SIMILAR SPECIES** *Armillaria mellea* (p.80) has a stem ring. *Clitocybe* species (pp.31, 33–4, 39–40) lack the cap scales and the black mycelial strands.



erect brown scales at cap center

fibrous, off-white stem

FRUITING In clusters on the ground near trees such as oaks; it kills the host tree.

Dimensions CAP ⊕ 2.5–10cm | STEM ↕ 7.5–20cm ↔ 0.5–1.5cm	Spores Pale cream	Edibility 🍽

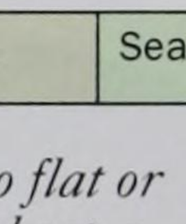
Family BOLETACEAE	Species *Phylloporus rhodoxanthus*	Season Summer–autumn

GILLED BOLETE

This species has a dry, reddish brown cap. Its stem is red to reddish yellow. This is a gilled bolete, but it may produce a tube layer and is more closely related to pored boletes, such as *Boletus pascuus* (p.192), than to agarics. The gills are easily separated from the yellow to red-tinged flesh.

• **OCCURRENCE** Mycorrhizal with oak; also found under conifers. Widespread and common in northern temperate zones, except the far north.

• **SIMILAR SPECIES** *Phylloporus leucomycelinus* has a white mycelium at the base.



convex to flat or depressed cap

bright yellow gills may bruise green or blue

decurrent gills with interlinking veins

FRUITING Singly or scattered in small groups or troops.

Dimensions CAP ⊕ 2.5–7.5cm | STEM ↕ 4.5–10cm ↔ 0.5–1cm	Spores Ochre-yellow	Edibility 🍽

Crumbly Flesh Exuding Milk

BELONGING EXCLUSIVELY to the genus *Lactarius*, all species in this subsection have slightly decurrent gills and variable cap shapes, and almost all exude a white or colored fluid from cut or broken flesh. This "milk" may change color rapidly on exposure and is a good identification feature; the best way to see this is by testing one or two drops on a white handkerchief.

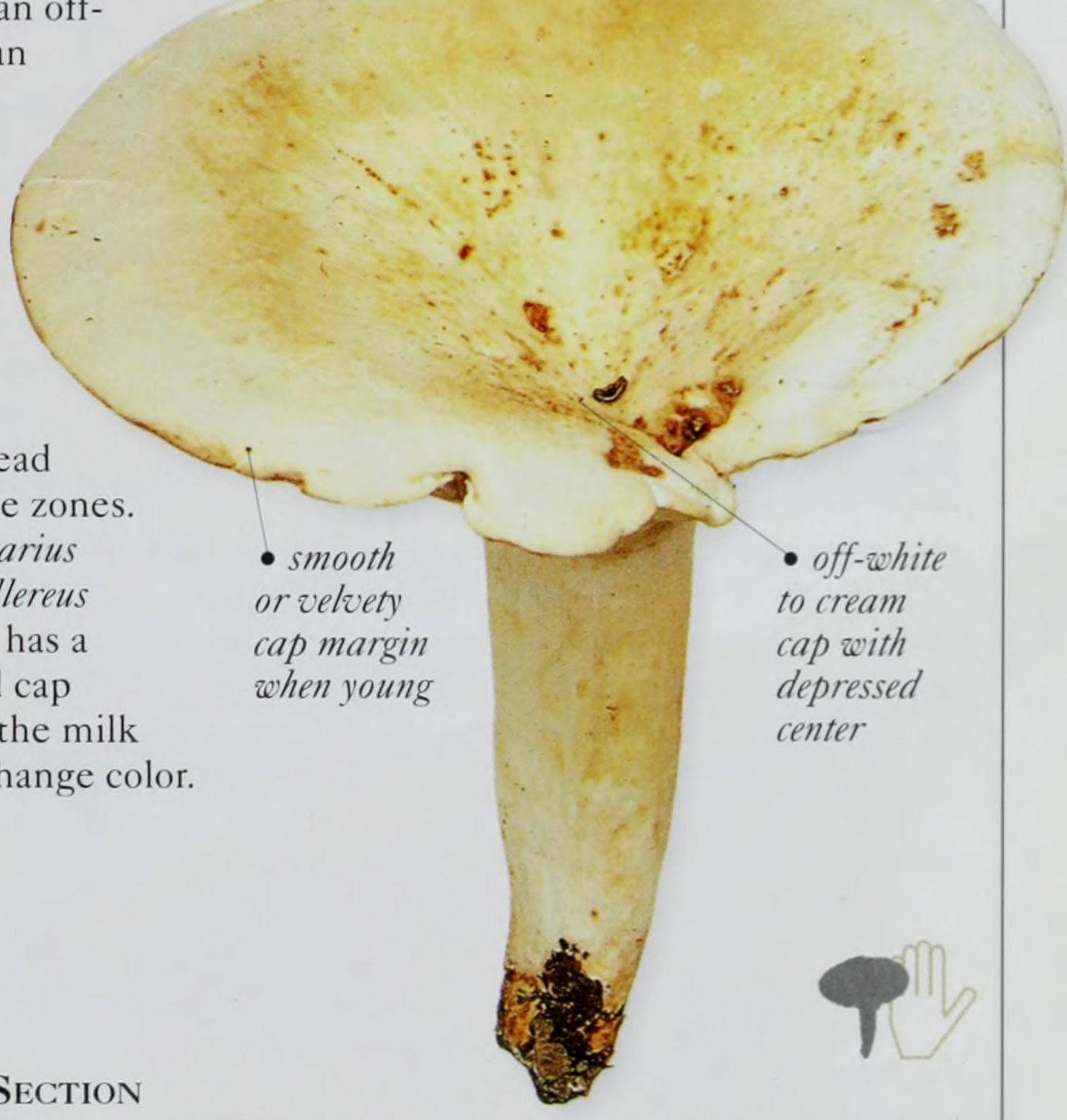
Family RUSSULACEAE	Species *Lactarius piperatus*	Season Summer–early autumn

Peppery Lactarius

This large, crumbly-fleshed species has an off-white fruitbody, very crowded gills, and an almost smooth cap that is depressed in the center. The white milk, which dries olive-green, has a very peppery taste. Although not edible, this species can be rendered safe by layering in salt and storing before cooking.

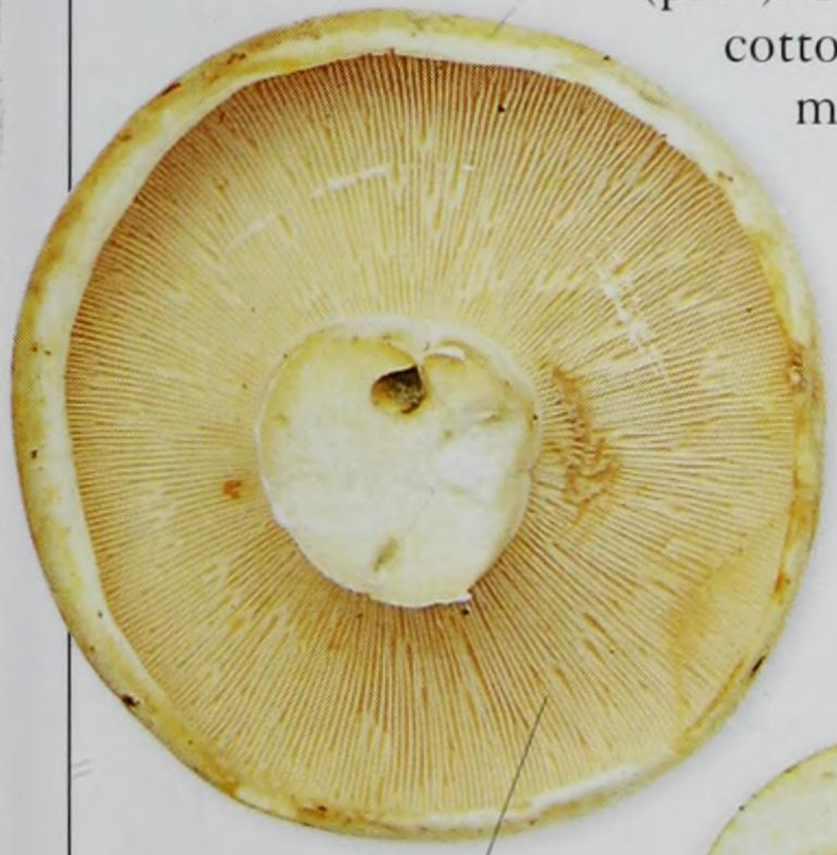
• **OCCURRENCE** Mycorrhizal with both deciduous and coniferous trees in woodlands on well-drained soil. Widespread and rather common in northern temperate zones.

• **SIMILAR SPECIES** The milk of *Lactarius glaucescens* dries grayish blue-green. *L. vellereus* (p.44). *L. deceptivus* has a cottony inrolled cap margin, and the milk does not change color.



• smooth or velvety cap margin when young

• off-white to cream cap with depressed center



very crowded, off-white gills may have spots of dried olive-green milk

SECTION

decurrent gills

white flesh throughout

FRUITING In fairy rings and troops in woodland.

△ *HYPOMYCES LACTIFLUORUM* This orange-red flask mushroom parasitizes *Lactarius* (pp.45–55) and *Russula* species (pp.120–31). If the host is edible, it can be eaten.

Dimensions CAP ⊕ 8–20cm | STEM ↕ 8–15cm ↔ 2–4cm	Spores Off-white	Edibility

Family RUSSULACEAE	Species *Lactarius vellereus*	Season Autumn

FLEECY LACTARIUS

The white to cream cap of this very large species is densely felted and has a clear central depression. Its cream gills are fairly crowded, and it has a comparatively short, tapered stem. The white milk from its crumbly white flesh is copious and dries to brown on the gills; it does not stain with potassium hydroxide (KOH).

• **OCCURRENCE** Mycorrhizal with deciduous trees, such as beech, but also found with various conifers. Exact range unknown but widespread in northern temperate zones.

• **SIMILAR SPECIES** The milk in *Lactarius bertillonii* stains yellow then orange with KOH and has a hot taste. *L. piperatus* (p.43) is distinguished by more crowded gills, a longer stem, and a smooth cap.

cap white to cream with felted surface

huge cap with deep depression in center, almost funnel-shaped at maturity

cream gills are decurrent

short, thick, smooth stem

fairly crowded gills

milk is almost mild in taste, but flesh is acrid

milk dries to brown on gills

FRUITING In rings and troops in leaf litter under trees.

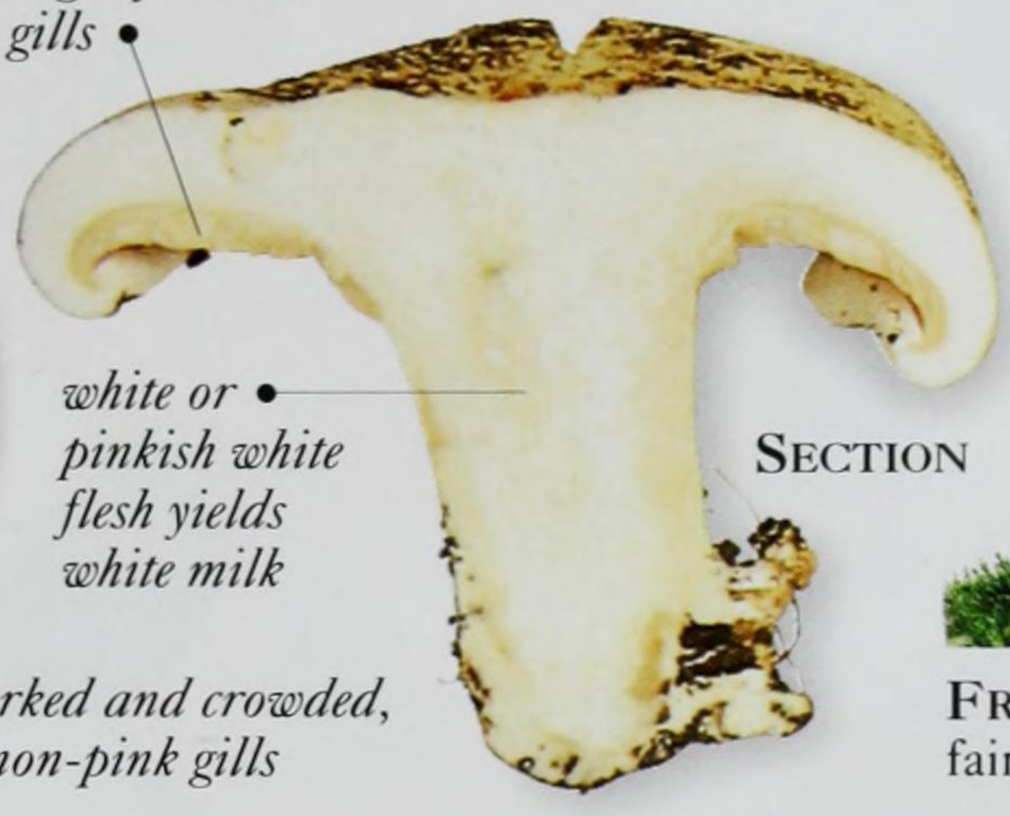
Dimensions CAP ⇔ 10–25cm | STEM ↕ 4–8cm ↔ 2–5cm	Spores Off-white	Edibility

Family RUSSULACEAE	Species *Lactarius controversus*	Season Autumn

PINK GILL LACTARIUS

Salmon-pink gills distinguish this mushroom from other *Lactarius* species. It is off-white, with faint gray or pink zoning on the convex to depressed cap, which has an inrolled margin. The short stem is white or flushed pink to gray; the crumbly flesh exudes copious white milk, which does not change color as it dries.

• **OCCURRENCE** Mycorrhizal with both willow and poplar, in woods and sand dunes. Widespread in northern temperate zones but not very common.



SECTION

FRUITING Singly or in fairy rings or troops.

Dimensions CAP ⇔ 7–20cm | STEM ↕ 2–7cm ↔ 1.5–4cm	Spores Off-white	Edibility

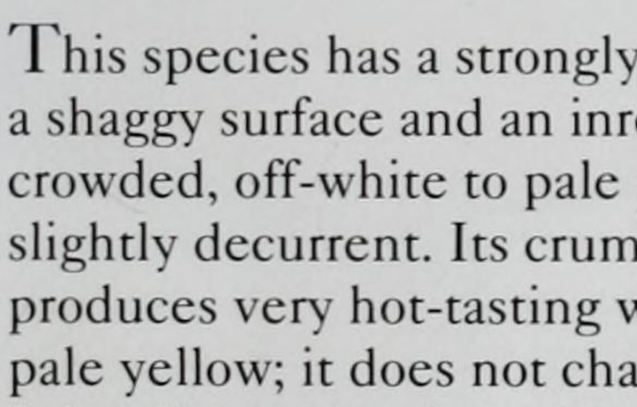
Family RUSSULACEAE	Species *Lactarius torminosus*	Season Summer–autumn

WOOLLY LACTARIUS

This species has a strongly depressed cap with a shaggy surface and an inrolled margin. The crowded, off-white to pale pink gills are slightly decurrent. Its crumbly white flesh produces very hot-tasting white milk and stains pale yellow; it does not change color as it dries. It is edible only after salting and pickling.

• **OCCURRENCE** Mycorrhizal with birch; often found in open, grassy sites. Widespread and common in parts of northern temperate zones.

• **SIMILAR SPECIES** *Lactarius pubescens* is paler and has a less shaggy cap and fainter zones. *L. scoticus* is also pale and is smaller.



FRUITING In rings and troops on damp ground.

SECTION

Dimensions CAP ⇔ 5–15cm | STEM ↕ 3–6cm ↔ 1–3cm	Spores Pale yellowish cream	Edibility

Family RUSSULACEAE	Species *Lactarius deliciosus*	Season Late summer–autumn

ORANGE LATEX LACTARIUS

This brownish orange species has a depressed cap with faint concentric zones and an inrolled margin; its short stem is covered with orange depressions. It has thick, crumbly, pale yellow to orange flesh yielding carrot-orange milk, which does not change color. A choice edible, it has the harmless, if slightly alarming, effect of making urine turn red.

• **OCCURRENCE** Mycorrhizal with pine trees, often on sandy, alkaline soil. Widespread in northern temperate zones, but distribution is unclear.

• **SIMILAR SPECIES** *Lactarius deterrimus* (inset, below left). *L. indigo* has blue flesh and milk in the cap and stem. It grows with pines. *L. salmonicolor*, which grows with firs, is larger. *L. semisanguifluus* (inset, below right).

SECTION

△ *LACTARIUS DETERRIMUS*
Found with spruce trees, this has a smooth stem and exudes green-staining orange milk. Common and widespread in the Rockies. 🍽

△ *LACTARIUS SANGUIFLUUS*
This species is a popular edible, particularly in Spain. It has blood-red milk, staining green as it dries. It is mycorrhizal with pine. 🍽

FRUITING In groups or troops in grass or pine litter.

Dimensions CAP ⟷ 5–15cm | STEM ↕ 3–7cm ↔ 1–3cm	Spores Off-white	Edibility 🍽

Family RUSSULACEAE	Species *Lactarius necator*	Season Summer–autumn

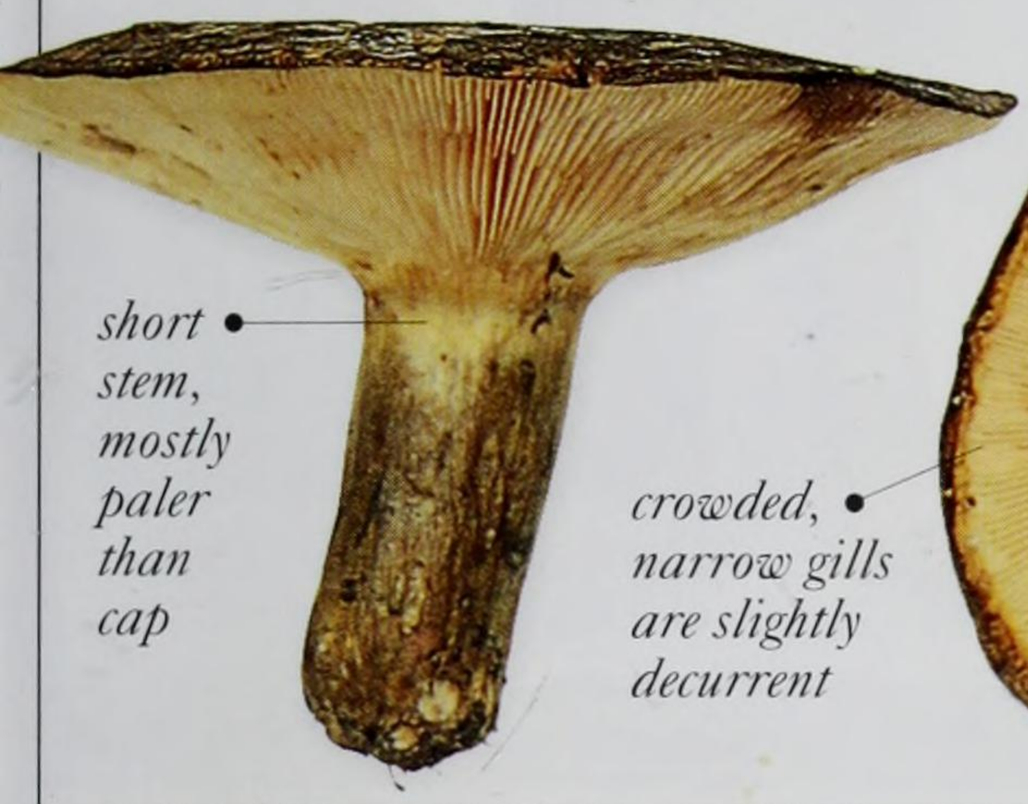
MUTAGEN LACTARIUS

Marked by its dark olive-green coloring, this species has a sticky cap with a depressed center and a felty margin, inrolled when young. The crumbly white flesh produces copious white milk, which dries in greenish brown spots on the off-white to pale green gills. Although eaten salted or marinated in eastern Europe, it may contain carcinogens.

• **OCCURRENCE** Mycorrhizal with birch and spruce, in woods, parks, and gardens. Widespread from Europe to east Asia; absent in North America.

• **SIMILAR SPECIES** *Lactarius blennius* (below) and *L. fluens* are paler and often more distinctly zoned or spotted on their caps.

• *shiny, dark olive-green cap*



short stem, mostly paler than cap

crowded, narrow gills are slightly decurrent

FRUITING Singly, a few together, or in troops.

Dimensions CAP ⊕ 6–15cm | STEM ↕ 4–7cm ↔ 1–2.5cm	Spores Off-white	Edibility ☠

Family RUSSULACEAE	Species *Lactarius blennius*	Season Summer–autumn

EURO SLIMY LACTARIUS

This species has a smooth cap with a central depression. Of varying shades, usually in a mixture or brown, gray, and olive, it is typically ringed with dark spots near the cap margin. Its firm white flesh produces white milk that dries to olive-gray on the white gills. Although considered inedible, it has been eaten after boiling or salting.

• **OCCURRENCE** Mycorrhizal with beech. Widespread and very common in Europe and adjacent parts of Asia.

• **SIMILAR SPECIES** *Lactarius circellatus* grows only under hornbeam and has darker, ocher gills. *L. fluens* is larger and greener with cream gills and a zoned cap with a near white margin. *L. hortensis* (p.48). *L. trivialis* (p.49).

smooth cap is slimy when wet

smooth stem is paler than cap

spots of milk on crowded gills

slightly decurrent white gills

SECTION

FRUITING Mostly found in troops in beech litter.

Dimensions CAP ⊕ 4–9cm | STEM ↕ 3–7cm ↔ 1–2.5cm	Spores Pale yellow	Edibility 🍽

Family RUSSULACEAE	Species *Lactarius fuliginosus*	Season Autumn

VELVETY LACTARIUS

This species has a brown, slightly velvety cap, often with a central depression, and a tapering, pale brown to almost white stem. The firm, off-white flesh becomes pink-brown on exposure. White milk is exuded and slowly turns pink on the flesh. The ocher gills bruise pinkish brown. The spores are spherical, with crests and a netted surface.

• **OCCURRENCE** Mycorrhizal with deciduous trees, such as oak and beech, in woods. European, but world distribution unclear.

• **SIMILAR SPECIES** Other brown *Lactarius* species with white milk that turns pink are identified by the speed with which this occurs and by cap color and spore ornament: *L. acris* is pale and fast staining; *L. lignyotus*, found by conifers, is dark brown velvet, and slow reacting; *L. pterosporus* has a lighter colored cap and winged spores.

FRUITING Appears singly or a few together.

Dimensions CAP ⟷ 6–10cm | STEM ↕ 4–7cm ↔ 1–1.5cm	Spores Pale ocher	Edibility

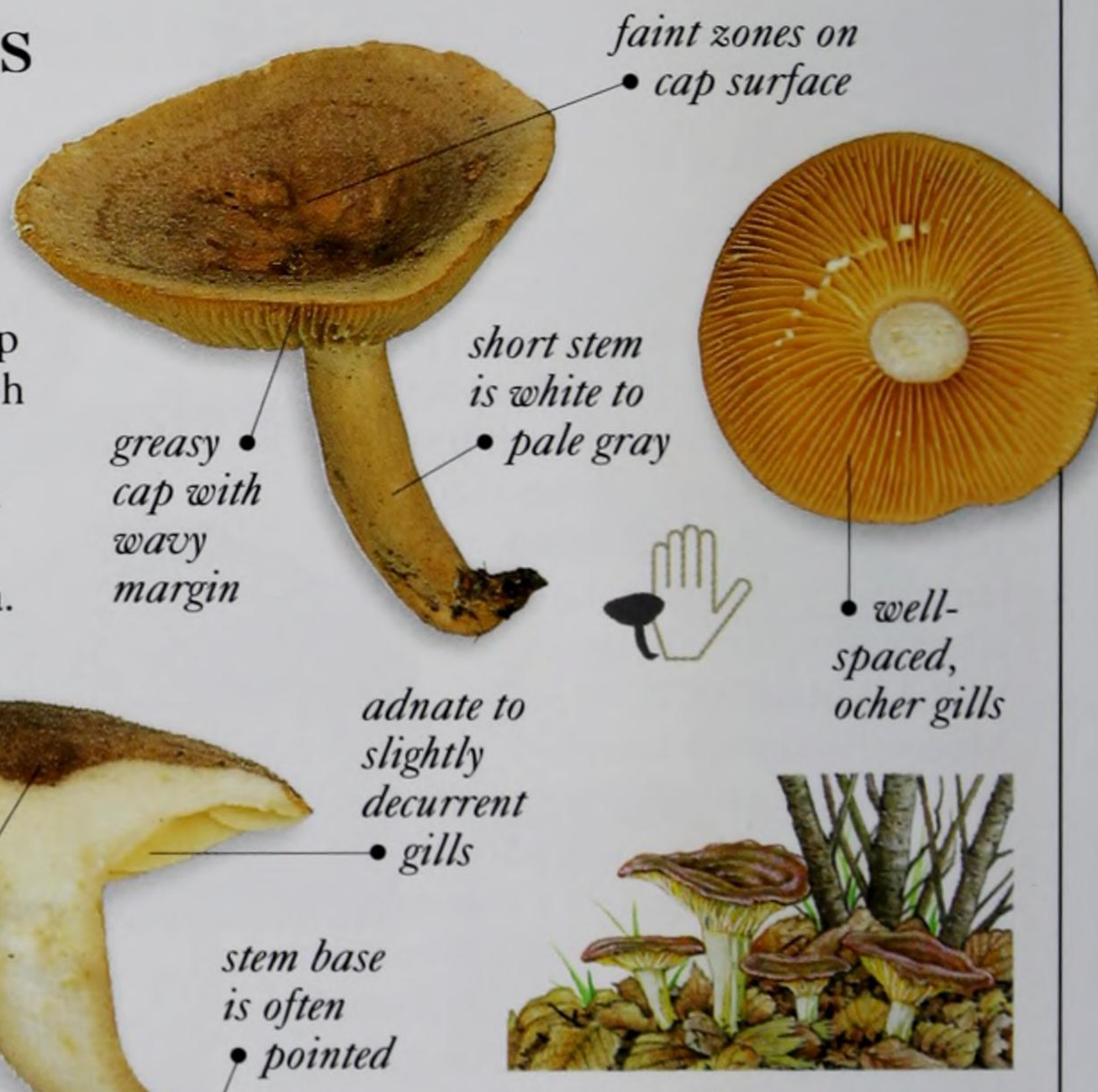
Family RUSSULACEAE	Species *Lactarius pyrogalus*	Season Summer–autumn

ZEBRA-SPORED LACTARIUS

The pale gray-brown cap of this species is often wavy margined with a depressed center; it is faintly concentrically zoned and slightly greasy. The ocher gills are unusually well spaced for a *Lactarius* species. A tiny drop of the white milk yielded by the crumbly flesh produces a burning taste that lasts for hours.

• **OCCURRENCE** Mycorrhizal with hazel in woods or gardens. Widespread and fairly common in Europe and adjacent areas of Asia.

• **SIMILAR SPECIES** *L. circellatus* grows with hornbeam trees. It has more crowded gills and more dense, well-marked zones on the cap. *L. vietus*, which grows under birch trees, is more violet-gray, less zoned, and has yellowish white gills, gray-spotted with age. Its white milk dries lead-gray.



FRUITING In troops or a few together on fertile soil.

Dimensions CAP ⟷ 4–10cm | STEM ↕ 3–7cm ↔ 0.5–2cm	Spores Pale ocher-yellow	Edibility

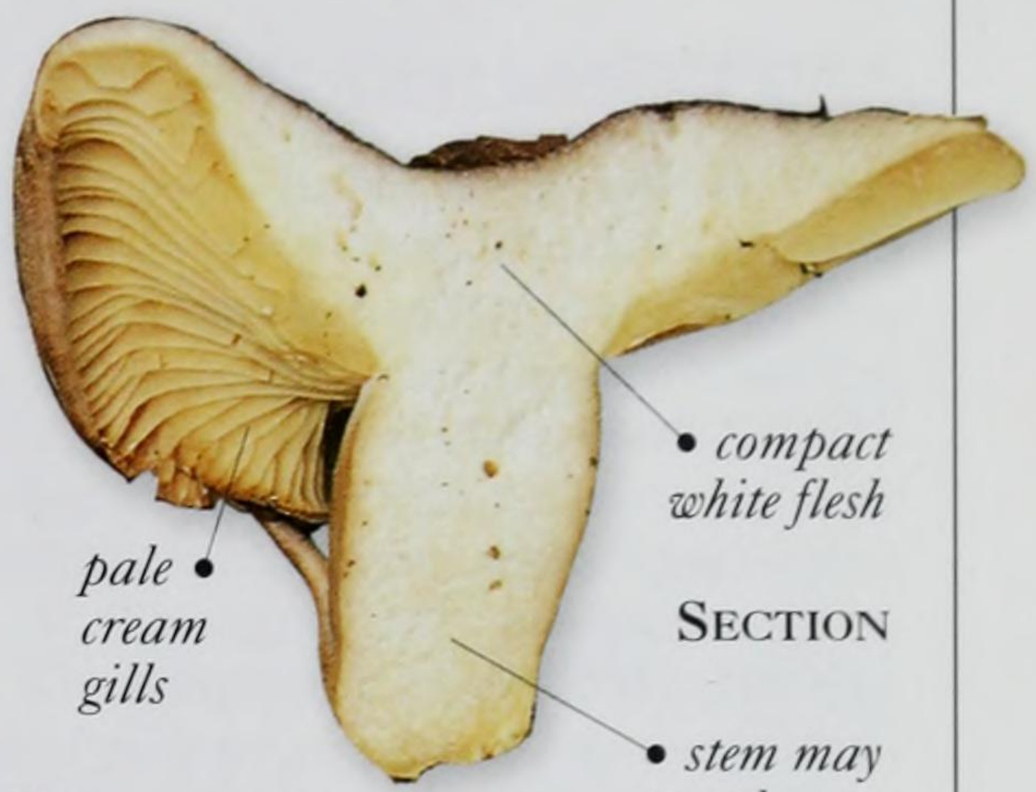
Family RUSSULACEAE	Species *Lactarius trivialis*	Season Summer–autumn

SLIMY LEAD LACTARIUS

This species has a large, fleshy cap that is often spotted or faintly concentrically zoned. It appears in colors ranging from violet- to yellow-gray. The crumbly white flesh exudes acrid white milk that dries to greenish beige on the gills. It is safe only after salting and storing.

• **OCCURRENCE** Mycorrhizal with conifers and birch, often in damp woodlands. Widespread and locally common in northern temperate zones.

• **SIMILAR SPECIES** *Lactarius argillacefolius* grows in eastern North America under oaks and has gills that stain and age brownish.



FRUITING In troops or a few fruitbodies together.

Dimensions CAP ⊕ 6–20cm | STEM ↕ 4–10cm ↔ 1–3cm	Spores Pale yellow	Edibility

Family RUSSULACEAE	Species *Lactarius pallidus*	Season Autumn

PALLID LACTARIUS

The cap and stem of the Pallid Lactarius are pale buff-yellow with a pale pink tinge. The cap is very faintly concentrically zoned and convex to depressed in the center. Its copious white milk does not stain, and the thick white flesh tastes mild to slightly bitter. It has a very faint smell.

• **OCCURRENCE** Mycorrhizal with beech in woods and parks. Widespread in Europe; rare in North America.

• **SIMILAR SPECIES** *Lactarius blennius* (p.47). *L. curtus* has hot-tasting milk. *L. musteus* is slightly darker and grows under conifers.

FRUITING Mostly a few fruitbodies appear together.

Dimensions CAP ⊕ 5–12cm | STEM ↕ 3–8cm ↔ 0.5–2cm	Spores Pale ocher	Edibility

Family RUSSULACEAE	Species *Lactarius mitissimus*	Season Autumn

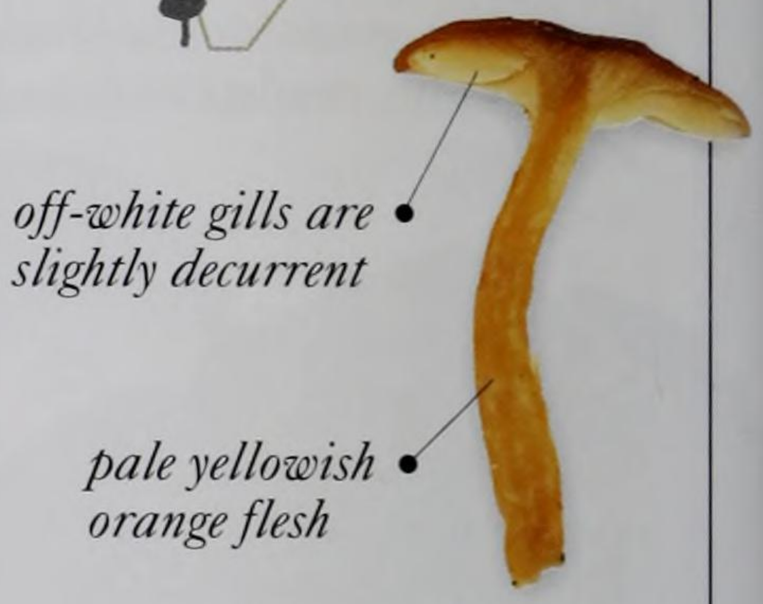
MILD LACTARIUS

This smallish lactarius has a convex orange cap that develops a central depression with age. Its crumbly, pale yellowish orange flesh has a mild taste and produces copious, nonstaining, white milk.

• **OCCURRENCE** Mycorrhizal with conifers and deciduous trees, often found with moss. Widespread in Europe; similar, closely related forms are found in other northern temperate zones.

• **SIMILAR SPECIES** Relatives of a similar size tend to be darker, less vividly orange, or with more or less hot-tasting milk. *Lactarius ichoratus* is slightly larger, reddish orange, and has an unpleasant, sickly smell. *L. volemus* (p.54) is larger.

FRUITING Typically, a few fruitbodies appear together.



SECTION

Dimensions CAP ⟷ 2–6cm | STEM ↕ 2–5cm ↔ 3–8mm	Spores Creamy pink	Edibility

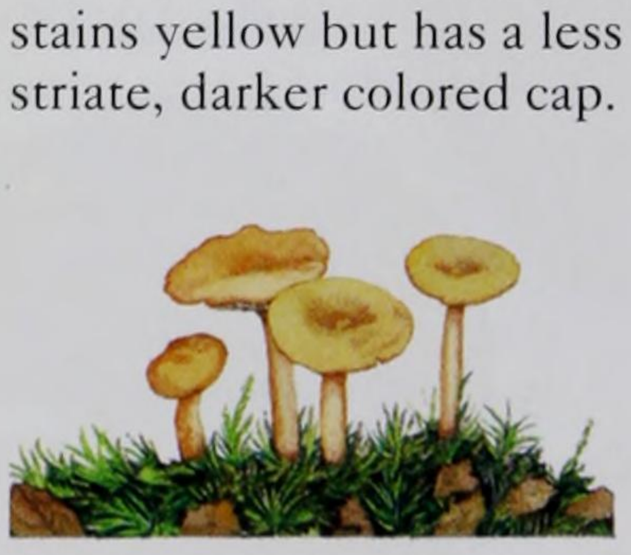
Family RUSSULACEAE	Species *Lactarius theiogalus*	Season Autumn

YELLOW-STAINING LACTARIUS

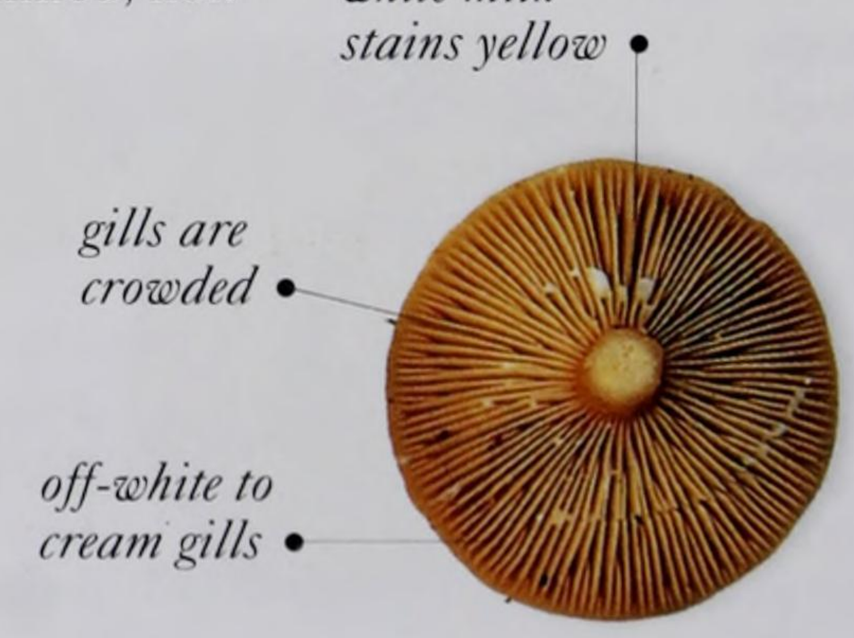
The pale orange-tinted, gray-brown cap of this species has a central umbo; its margin is often furrowed. Its thin, pale flesh tastes mild, and the white milk stains yellow on a white handkerchief in 30 seconds or less. The stem is fairly long and is a similar color to the cap. The larger, more wrinkled form is sometimes regarded as a separate species, *Lactarius tabidus*.

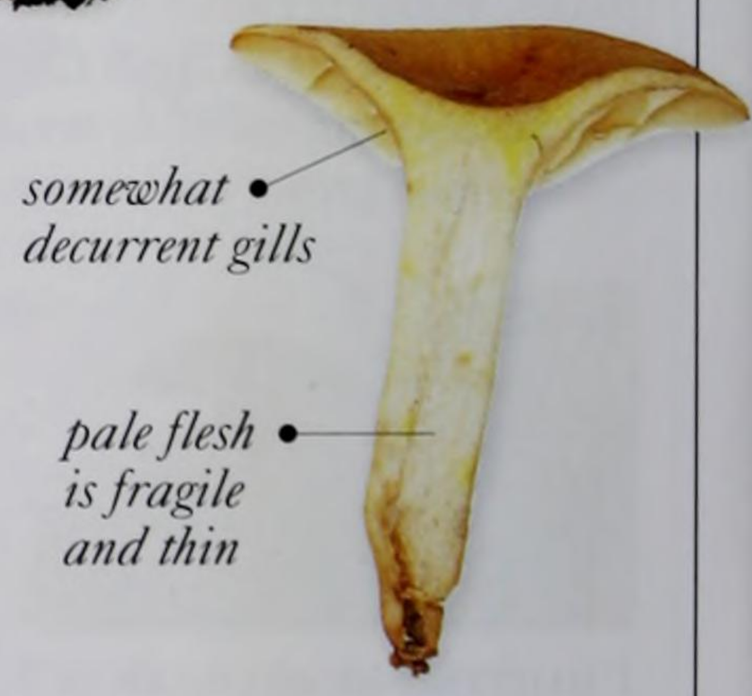
• **OCCURRENCE** Mycorrhizal with conifers and deciduous trees, often in damp, acid conditions among leaf litter. Widespread and common in many areas of northern temperate zones.

• **SIMILAR SPECIES** *L. lacunarum* also stains yellow but has a less wrinkled, non-striate, darker colored cap.



FRUITING In troops or a few fruitbodies together.





SECTION

Dimensions CAP ⟷ 2–5cm | STEM ↕ 3–8cm ↔ 0.4–1cm	Spores Off-white, tinged pink	Edibility

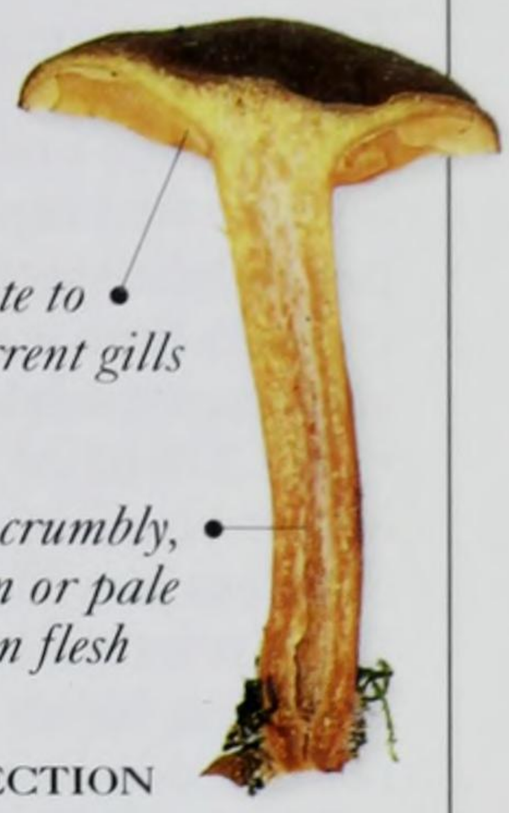
Family RUSSULACEAE	Species *Lactarius hepaticus*	Season Autumn

LIVER LACTARIUS

The smooth cap of this mushroom has a depressed or slightly raised center and is dull liver-brown. The stem is a similar color or paler. It has crumbly, cream to pale brown flesh, exuding white milk that turns yellow. The flesh tastes hot and is not recommended for eating.

• **OCCURRENCE** Mycorrhizal with pine trees in woods and stands on very acidic, sandy soil; it has become more common because of the increase in acid rain. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *Lactarius badiosanguineus* is shinier and red-brown; its milk displays a faint yellow reaction. *L. rufus* (p.53) is often found in the same habitat and has unchanging milk. The much paler *L. theiogalus* (p.50) has the same yellow milk reaction.



SECTION

FRUITING In small groups or troops on pine needles.

Dimensions CAP ⟷ 3–6cm | STEM ↕ 4–6cm ↔ 0.6–1cm	Spores Cream	Edibility

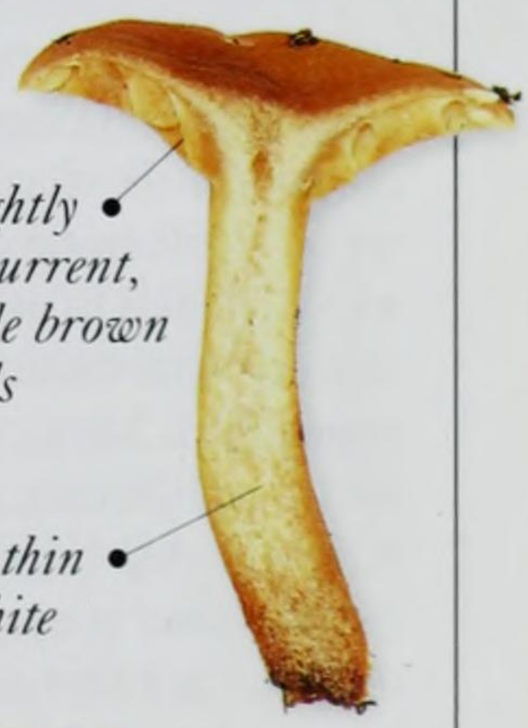
Family RUSSULACEAE	Species *Lactarius subdulcis*	Season Summer–autumn

DULL LACTARIUS

This species is most easily identified by its negative characteristics. These include white milk that does not turn yellow and thin white flesh without a hot taste. The buff to dull brown cap is convex with a center that may be slightly depressed or umbonate. The stem is a similar color to the cap, and the slightly decurrent gills are off-white at first, becoming pale brown.

• **OCCURRENCE** Mycorrhizal with deciduous trees, chiefly beech. Widespread and common in Europe; world distribution unknown.

SECTION



FRUITING Typically a few fruitbodies appear together.

Dimensions CAP ⟷ 3–7cm | STEM ↕ 3–6cm ↔ 0.5–1cm	Spores Cream to pink-cream	Edibility

Family RUSSULACEAE	Species *Lactarius hygrophoroides*	Season Summer–autumn

DISTANT-GILLED LACTARIUS

This orange-brown species has a convex to flat or depressed cap without any zoning. Both the cap and the stem have a dry surface. The crumbly flesh is white and exudes abundant, unchanging white milk, which has a mild taste.

• OCCURRENCE
Mycorrhizal, especially with oak trees in wooded areas. Widespread and common in eastern North America; not found in Europe.

• SIMILAR SPECIES
Lactarius corrugis has a reddish brown cap with a wrinkled margin, ocher gills, and milk that stains brown. See also *L. volemus* (p.54). Both are choice edibles, and all three species can be found in the same area at the same time of the year.

FRUITING Appears in scattered but often abundant troops on the ground in open woodland.

Dimensions CAP ⟷ 3–10cm | STEM ↕ 3–5cm ↔ 0.5–1.5cm	Spores White	Edibility

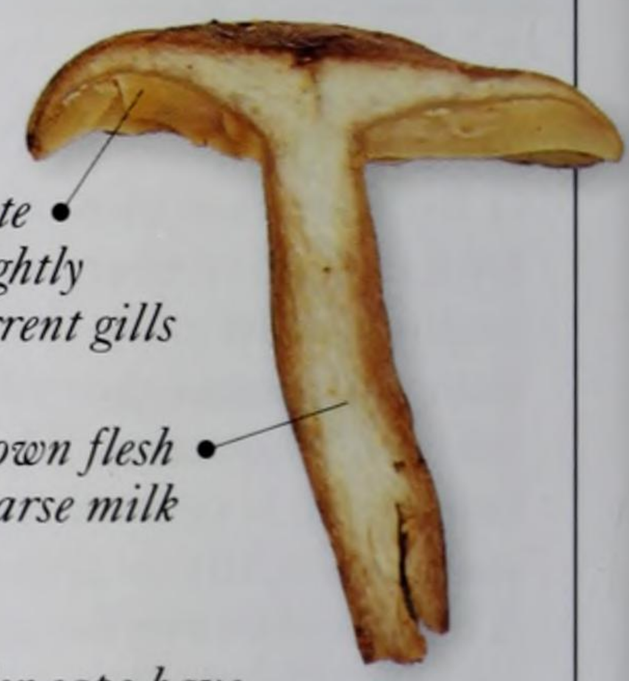
Family RUSSULACEAE	Species *Lactarius quietus*	Season Summer–autumn

OAK LACTARIUS

This abundant species produces a variably zoned, dull gray- to red-brown cap, which has a slight depression when mature. It has crumbly, pale brown flesh and exudes sparse, creamy milk that does not change. Its characteristic oily smell is often likened to the smell of stinkbugs.

• OCCURRENCE Strictly mycorrhizal with oak trees, in mostly acidic woodland. Very common in Europe and neighboring parts of Asia.

• SIMILAR SPECIES *Lactarius chrysorrheus* is also mycorrhizal with oak but is paler and more yellow; it has copious white milk that quickly turns sulfur-yellow. *L. serifluus* has a similar but even stronger smell and a much darker cap.



SECTION

FRUITING Appears in troops of fruitbodies.

Dimensions CAP ⟷ 4–8cm | STEM ↕ 3–7cm ↔ 0.5–1.5cm	Spores Cream to pink	Edibility

Family RUSSULACEAE	Species *Lactarius camphoratus*	Season Autumn

FRAGRANT LACTARIUS

This species is dark red-brown, with a depressed or umbonate cap center and a rather thin stem with a purple-brown base. Its strong chemical or spicy smell, reminiscent of camphor or lovage, develops as it dries; when fresh, it is similar to that of the paler, zoned *Lactarius quietus* (p.52). The crumbly, pale rust-brown flesh has an unpleasantly bitter aftertaste. The milk is watery white and does not change color.

• **OCCURRENCE** Mycorrhizal with conifers or deciduous trees, favoring acidic, well-drained soil. Sometimes found on mossy, decayed stumps. Widespread and quite common in northern temperate zones.

• **SIMILAR SPECIES** *L. helvus* (p.55) has a similar smell.

FRUITING In troops or small groups under trees.

Dimensions CAP ⊕ 3–6cm | STEM ↕ 3–6cm ↔ 4–8mm	Spores White to cream	Edibility

Family RUSSULACEAE	Species *Lactarius rufus*	Season Summer–autumn

RED-HOT LACTARIUS

Most specimens of this species have a cap that has a central depression with an umbo. The fruitbody is reddish brown, the gills being pale brown. The pale brown flesh is crumbly and exudes milk that remains white; the flesh tastes very hot after about 30 seconds but can be eaten only after being salted and then pickled.

• **OCCURRENCE** Mycorrhizal with conifers and birch, mostly on acid soil. This is one of the most familiar *Lactarius* species in many areas. Widespread and common in many regions of northern temperate zones.

• **SIMILAR SPECIES** *L. hepaticus* (p.51) exudes white milk that stains yellow as it dries.

FRUITING In troops or a few fruitbodies together.

Dimensions CAP ⊕ 3–10cm | STEM ↕ 5–10cm ↔ 0.5–2cm	Spores Off-white	Edibility

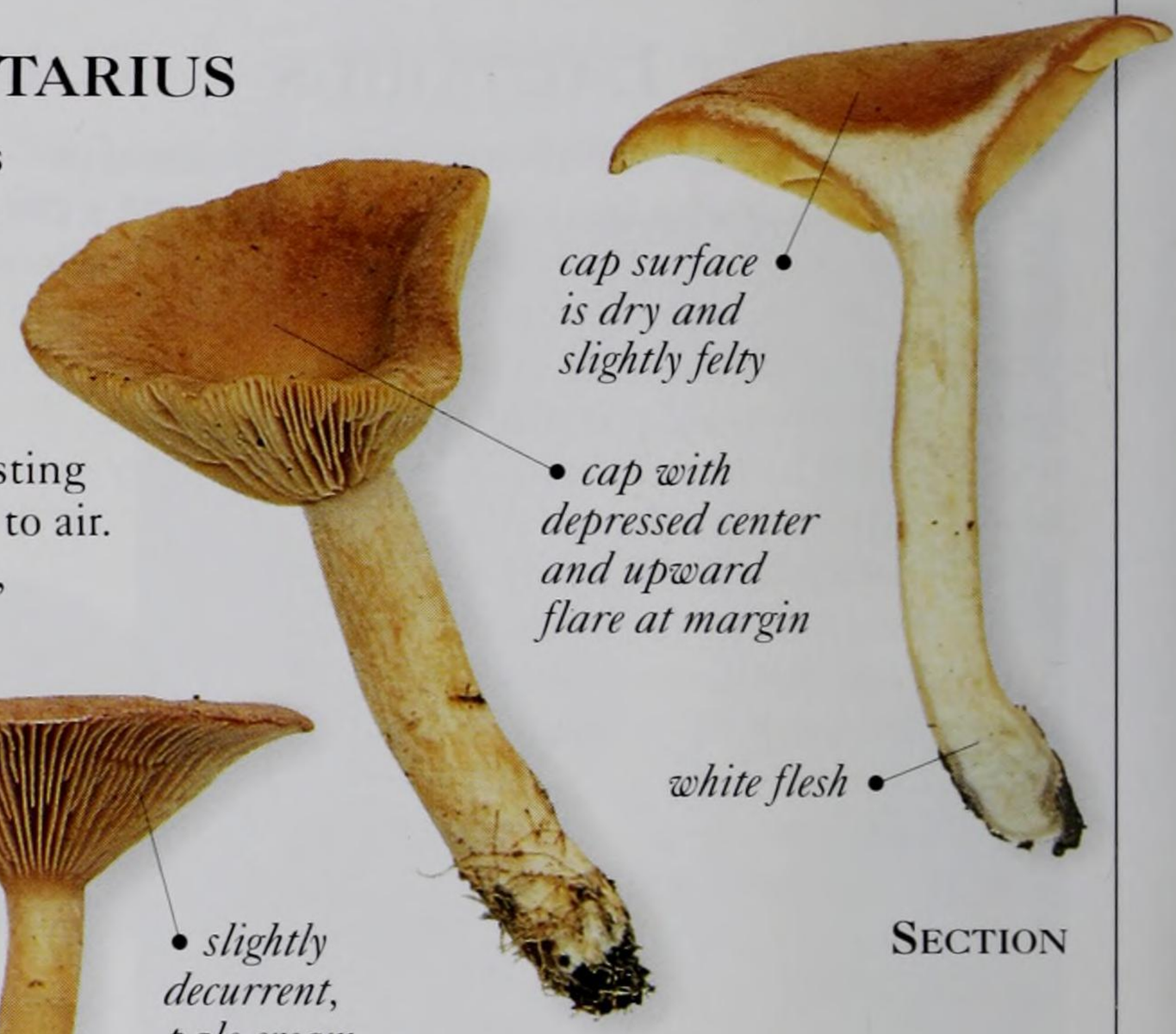
Family RUSSULACEAE	Species *Lactarius glyciosmus*	Season Summer–autumn

COCONUT-SCENTED LACTARIUS

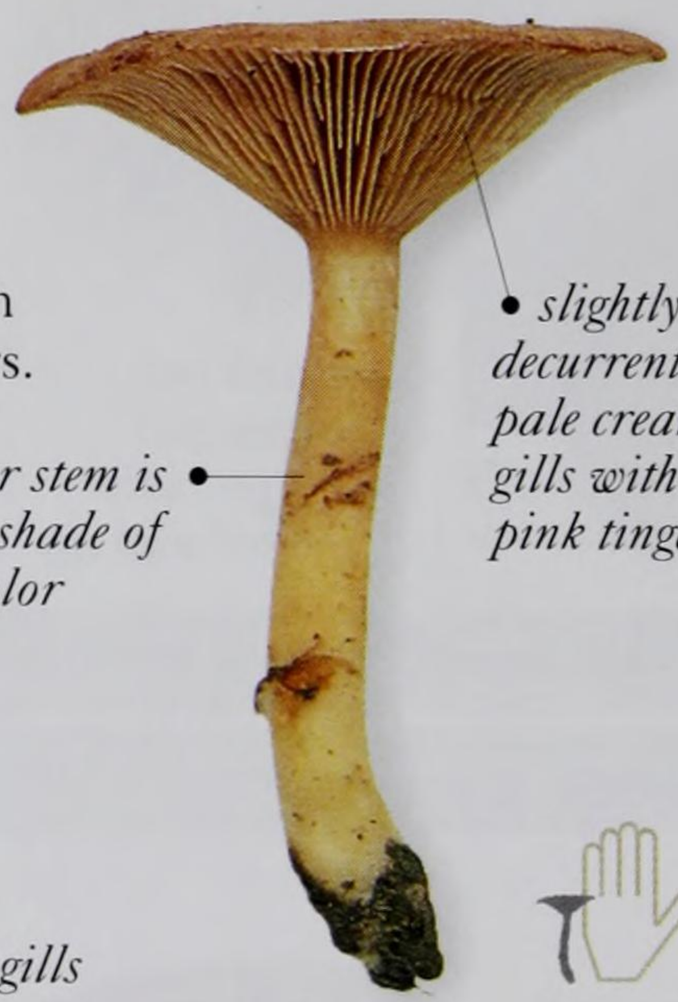
A smell like freshly baked coconut cookies exudes from this species, which has subtle gray to ocher coloring, with pink-tinged, pale cream gills. The cap may have a central depression and an upward-flaring margin. The thin white flesh produces sparse amounts of mild- or slightly acrid-tasting white milk that does not stain on exposure to air.

• **OCCURRENCE** Mycorrhizal with birch, often in damp places. Widespread and common in many areas of northern temperate zones.

• **SIMILAR SPECIES** *Lactarius hibbardae* in northeastern North America has the same odor but is much darker and grows with conifers.



SECTION



FRUITING Appears in troops among leaf litter.

Dimensions CAP ⇹ 2–6cm | STEM ↕ 2–7cm ↔ 0.5–1cm	Spores Pale yellow	Edibility

Family RUSSULACEAE	Species *Lactarius volemus*	Season Autumn

LUSCIOUS LACTARIUS

This very fleshy, matte orange species has a thin, cracking skin on its cap and a thick, paler orange stem with a velvety surface. When cut, its off-white, mild-tasting flesh produces copious white milk, which stains brown, and it smells strongly of shellfish, especially in mature specimens. The crowded, slightly decurrent gills are pale golden yellow.

• **OCCURRENCE** Mycorrhizal, mostly with oak and beech. Widespread but mostly uncommon in northern temperate zones.

• **SIMILAR SPECIES** *Lactarius hygrophoroides* (p.52), an equally common and choice edible in eastern North America, lacks the odor, does not stain, and has distant gills.

FRUITING In troops or a few together under deciduous trees, more rarely conifers.

Dimensions CAP ⇹ 6–12cm | STEM ↕ 4–12cm ↔ 1–4cm	Spores Off-white	Edibility

Family RUSSULACEAE	Species *Lactarius helvus*	Season Summer–autumn

POISON LACTARIUS

A strong, spicy smell, similar to curry or the herbs lovage and fenugreek, characterizes this yellow-ocher to gray-brown species. Fairly large, it becomes funnel-shaped, with a central umbo, as it matures. Its crumbly flesh is yellow, white, or pale pink, and its mild-tasting milk is more sparse and watery than in most *Lactarius* species.

• **OCCURRENCE** Mycorrhizal with birch, pine, and spruce trees; often found growing among sphagnum moss. Widespread in northern temperate zones.

• **SIMILAR SPECIES** *L. aquifluus* is very similar in appearance and occurs in North America.

SECTION

FRUITING In troops in wet, acidic sites under trees.

Dimensions CAP ⟷ 5–16cm | STEM ↕ 5–13cm ↔ 0.7–3cm	Spores Pale yellow to pinkish	Edibility ☠

CAP & STEM FUNGI WITH ADNEXED TO ADNATE GILLS

This section consists of agarics in which the gill attachment to the stem varies from very narrow (adnexed) to very broad (broadly adnate). Some gills have a sharp indentation close to the stem; this is known as a notch (see p.15). The gill edge may be straight or curved.

FLESHY WITH NO OBVIOUS VEIL

THIS SUBSECTION features agarics with fruitbodies that are fleshy but which, unlike other fleshy species, do not have obvious veil remains either on the cap, the cap margin, or the stem (pp.69–97). It includes the blewits and most of the mycorrhizal trichs, as well as a range of other groups.

Family HYGROPHORACEAE	Species *Hygrocybe punicea*	Season Autumn

CRIMSON WAX CAP

This large, fleshy mushroom has a broadly conical to almost flat, slightly moist, crimson-red cap and pale crimson-red to orange gills. The yellow stem is red flushed with a dry surface and a covering of fine, longitudinal fibers. Its taste and smell are unremarkable; it should not be eaten.

• **OCCURRENCE** In open deciduous and coniferous woods on the East and West coasts. Usually found growing with other species of *Hygrocybe*, *Geoglossum*, and *Clavulinopsis*; also in humus under coastal redwood trees in California.

• **SIMILAR SPECIES** *H. coccinea* (p.105). *H. splendidissima* is brighter vermilion-red with a dry cap and a sweet, sickly smell.

FRUITING Appears in small groups or troops.

Dimensions CAP ⟷ 4–12cm | STEM ↕ 5–12cm ↔ 0.5–2.5cm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Lepista irina*	Season Autumn

PUNGENT FALSE BLEWIT

This species is gray-brown all over, although the mature gills are pink tinged. The convex cap becomes flattened with age, and the stem has a fibrillose surface. The strongly perfumed, off-white flesh is edible in Europe, but the common American form makes some people ill.

• **OCCURRENCE** Typically on calcareous soil in leaf litter, sometimes in mass fruitings late in the season. Widespread in Europe; found in northern North America and the Rockies.

• **SIMILAR SPECIES** *Lepista nuda* (below) and *L. personata* (p.58) are of similar stature but have violet or lilac tints and fainter smells.

FRUITING Often in fairy rings on leaf litter in forests.

Dimensions CAP ⇔ 5–15cm | STEM ↕ 5–10cm ↔ 1–2cm	Spores Dingy pink	Edibility

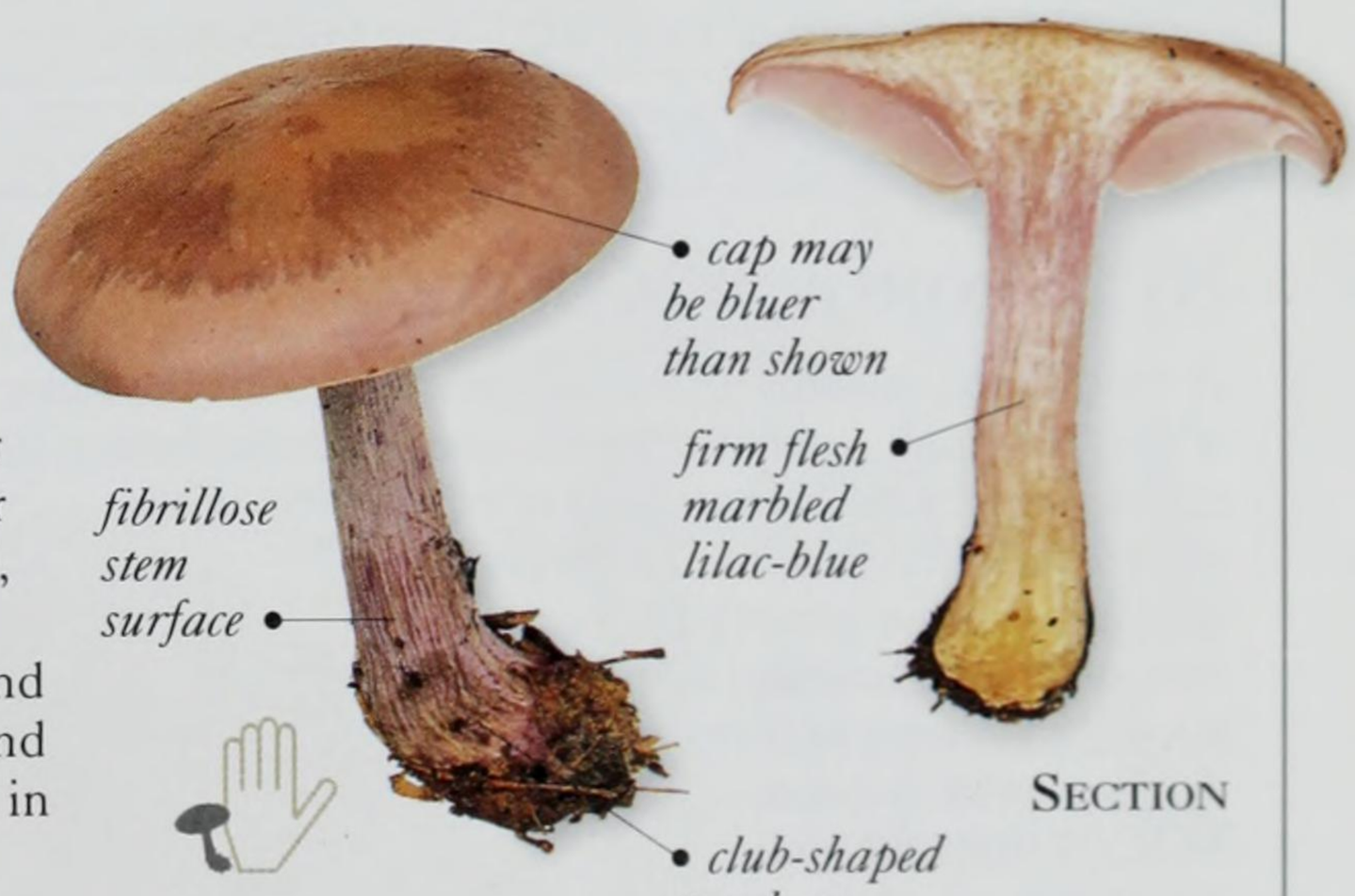
Family TRICHOLOMATACEAE	Species *Lepista nuda*	Season Mainly autumn

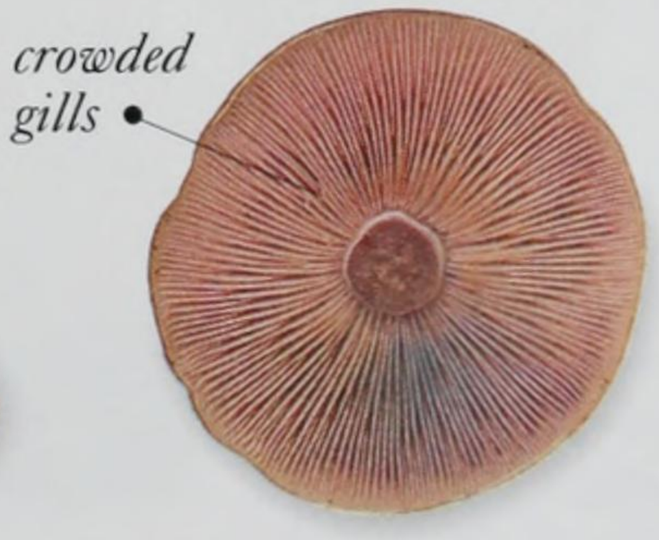
TRUE BLEWIT

The violet-brown cap of this easily identified, choice edible emerges dark and bun-shaped, becoming convex then flattened; its color becomes paler from the margin as the cap surface dries. The stem, with a club-shaped base, is a similar violet-brown; the sinuate gills are brighter violet, aging to buff-brown; the perfumed, firm flesh is marbled lilac-blue.

• **OCCURRENCE** Nutrient-rich woodland and garden habitats, such as in compost and thick leaf litter. Widespread and common in Europe and North America.

• **SIMILAR SPECIES** Unrelated poisonous look-alikes include species of *Entoloma* (p.68, 109–10, 144), *Cortinarius* (p.69–77), and *Hebeloma* (p.67, 82, 93).





FRUITING Appears in small groups and fairy rings.

Dimensions CAP ⇔ 5–20cm | STEM ↕ 4–10cm ↔ 1.5–3cm	Spores Dingy pink	Edibility

Family TRICHOLOMATACEAE	Species *Lepista personata*	Season Autumn

BLUE-STALKED BLEWIT

This fleshy agaric has a convex or bun-shaped, smooth-margined, pale leather-brown cap, which becomes flattened with age, and a fibrillose, bright lilac stem. The perfumed, firm flesh has a pale lilac tint. A popular edible, it is easy to identify.

• **OCCURRENCE** On rich alkaline soil, mostly in open grassland, roadsides, and parks but also on bare soil in woodland. Widespread and fairly common in Europe and North America.

• **SIMILAR SPECIES** *L. nuda* (p.57) is less squat in overall appearance and prefers woodland habitats.

SECTION

FRUITING In small groups or in well-developed rings.

Dimensions CAP ⟷ 5–20cm | STEM ↕ 3–7cm ↔ 1.5–4cm	Spores Brownish pink	Edibility

Family TRICHOLOMATACEAE	Species *Calocybe gambosa*	Season Late spring–summer

ST. GEORGE'S MUSHROOM

A very fleshy species, this mushroom is usually cream-white, although a pale brown to orange-brown form exists. It has a fleshy, rounded to convex cap with a slightly inrolled margin. The stem is smooth, and the adnexed gills are crowded. Smelling and tasting strongly yeasty with firm flesh, this is a much-valued edible.

• **OCCURRENCE** In grassland, woods, and quite often in gardens and parks. Widespread and locally common in Europe and adjacent parts of Asia. Not reported in North America.

• **SIMILAR SPECIES** Spring-fruiting white *Entoloma* species are distinguished by pink spore deposits and pink mature gills.

SECTION

FRUITING In troops or rings on rich, calcareous soil.

Dimensions CAP ⟷ 3–12cm | STEM ↕ 2–7cm ↔ 1–2.5cm	Spores Cream-white	Edibility

Family TRICHOLOMATACEAE	Species *Tricholoma terreum*	Season Autumn

DARK GRAY TRICH

The subtle colors of the Dark Gray Trich blend with the soil. It has an umbonate, dark gray cap with radial fibers and a smooth margin, and a silky-fibrillose, gray-white stem. The gills are sinuate, notched, and pale gray; unlike those of *Tricholoma scalpturatum* (below), they do not stain yellow. The pale flesh smells and tastes mild. It is edible, but see SIMILAR SPECIES.

• **OCCURRENCE** Mycorrhizal with conifers on rich, calcareous soil. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *T. pardinum* (p.60), is poisonous, bigger, scaly, and smells yeasty. *T. scalpturatum* (below).

FRUITING Appears in troops among needle debris.

medium-spaced, pale gray gills

dry, dark gray cap with central umbo

sinuate, notched gills

stem is short and sturdy

SECTION

fibrillose cap with a smooth margin

Dimensions CAP ⟷ 3–7cm | STEM ↕ 2–5cm ↔ 0.5–1.5cm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Tricholoma scalpturatum*	Season Early summer–late autumn

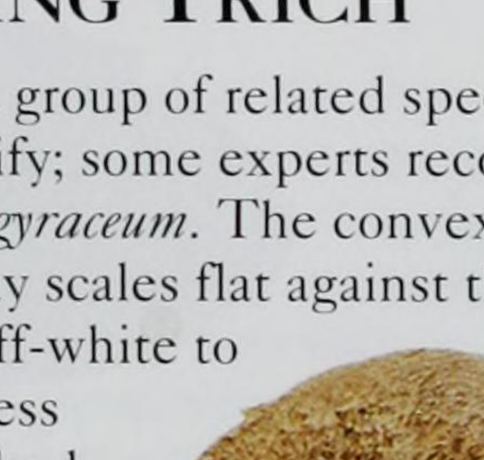
YELLOW-STAINING TRICH

This belongs to a complex group of related species, making it difficult to identify; some experts recognize a paler form as *Tricholoma argyraceum*. The convex to umbonate, pale cap has gray scales flat against the surface (adpressed). The off-white to pale gray stem is more-or-less fibrillose; the gills are notched and sinuate. All parts stain yellow with age. Not safe to eat because of poisonous look-alikes.

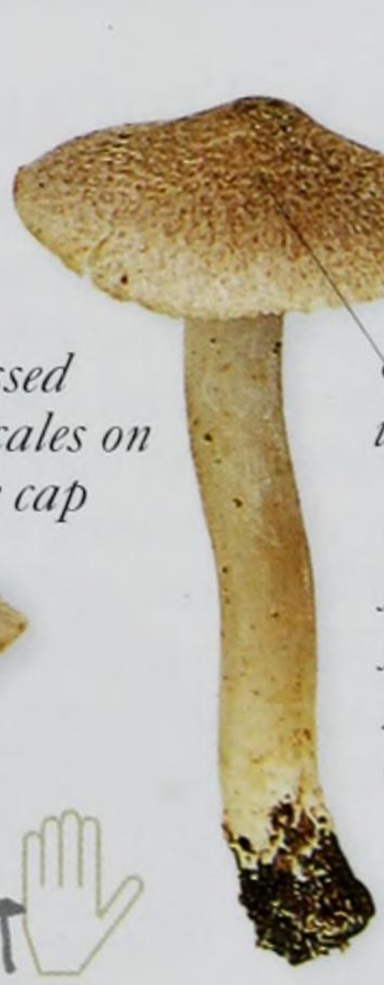
• **OCCURRENCE** Mycorrhizal with conifers and deciduous trees, often birch. Widespread and common in Europe; recently reported in northern Rockies.

• **SIMILAR SPECIES** Poisonous *T. pardinum* (p.60). *T. terreum* (above).

adpressed gray scales on pale cap



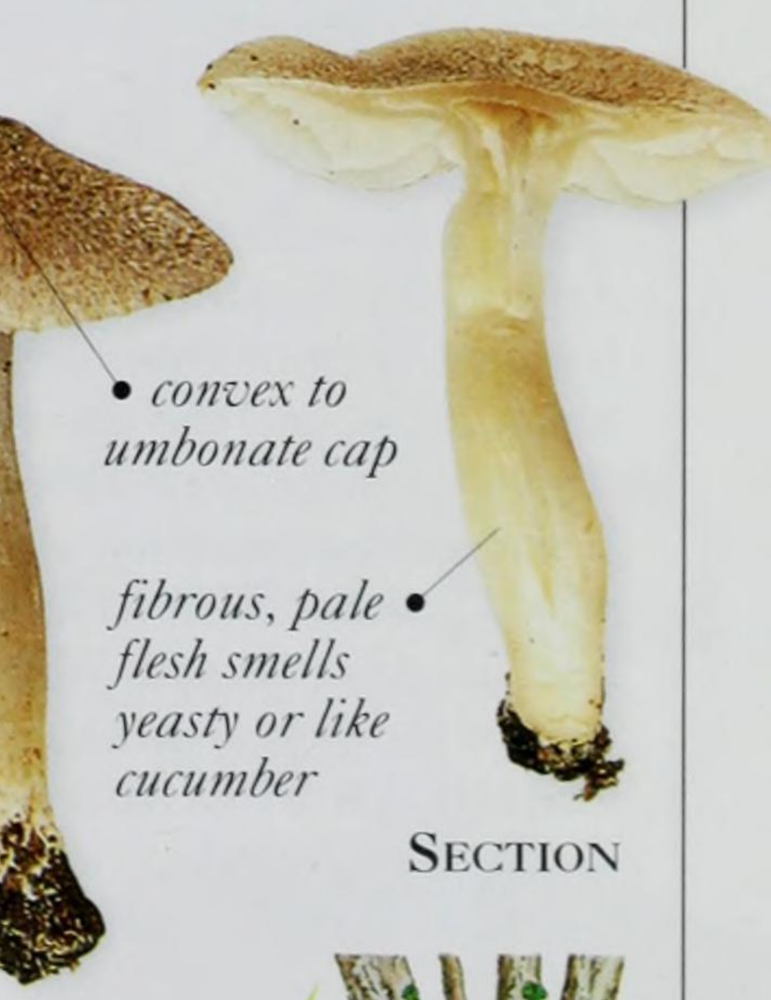
white to pale gray gills stain yellow



convex to umbonate cap

fibrous, pale flesh smells yeasty or like cucumber

SECTION



FRUITING Often in large troops of several hundred.

Dimensions CAP ⟷ 2–8cm | STEM ↕ 3–7cm ↔ 0.5–1cm	Spores White	Edibility

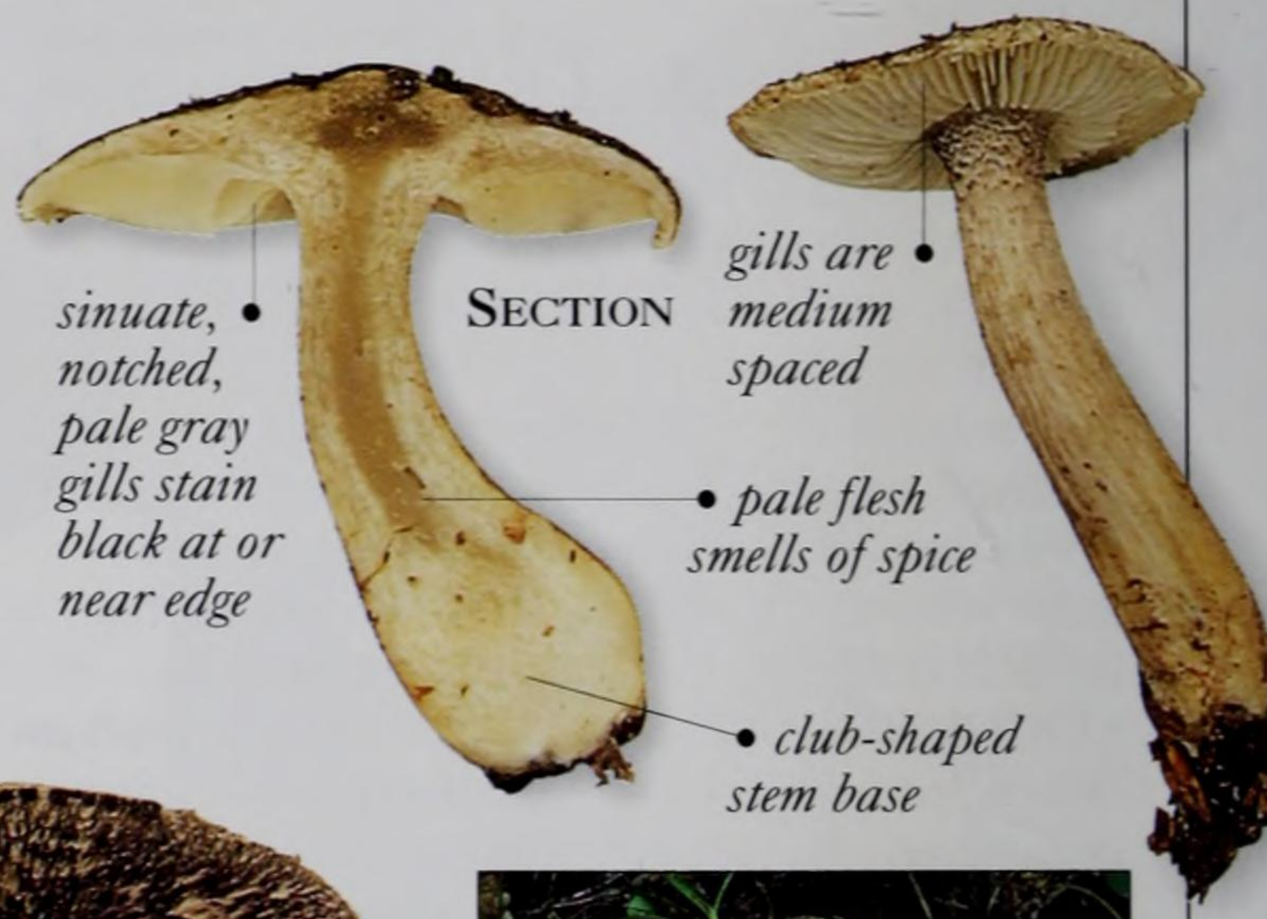
Family TRICHOLOMATACEAE	Species *Tricholoma atrosquamosum*	Season Autumn–late autumn

DIRTY TRICH COMPLEX

This complex has a convex or umbonate, pale gray cap, with radially arranged upturned, dark, threadlike, fibrous scales and an inrolled margin. The pale stem is covered with black scales, and the flesh is pale and fibrous with a spicy fragrance like geranium (*Pelargonium*). It can be hard to identify (see SIMILAR SPECIES), so eating it is not recommended.

• **OCCURRENCE** Mycorrhizal with conifers and deciduous trees. Widespread but local in Europe; world distribution not clear.

• **SIMILAR SPECIES** *Tricholoma orirubens* stains green and pink. *T. pardinum* (inset, right) is poisonous. *T. squarrulosum* is even more scaly.



FRUITING Singly or in small groups on alkaline soil.

△ *TRICHOLOMA PARDINUM* This species has a black-scaly cap and flesh that smells and tastes yeasty. It is found growing in mixed woods. ☠

Dimensions CAP ⇹ 3–12cm | STEM ↕ 4–8cm ↔ 0.5–1.5cm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Tricholoma sciodes*	Season Autumn

SPOTTED GILL TRICH

This species has an off-white cap partially concealed by dark scales flattened against the surface (adpressed); it has a fairly prominent umbo. The gills have distinctive black spots, and the more or less cylindrical, pale stem is clad in hairlike gray scales; both may be pink flushed. It has earthy-smelling, sharp-tasting flesh, and is inedible.

• **OCCURRENCE** Mycorrhizal with deciduous trees, often beech, on fertile soil. Widespread and common in Europe, except the boreal-arctic; world distribution not clear.

• **SIMILAR SPECIES** *Tricholoma orirubens* stains green and pink. *T. virgatum*, found in rich conifer forests, is silvery gray and conical.

FRUITING A few specimens together in leaf litter.

Dimensions CAP ⇹ 4–8cm | STEM ↕ 4–10cm ↔ 1–2cm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Tricholoma saponaceum*	Season Late summer–late autumn

SOAPY TRICH

An extremely variable species, the Soapy Trich is often divided into a number of varieties. All forms are fleshy and smell strongly of soap. Some have dark scales on the stem. The gills are cream to gray-green, staining in shades of red or becoming pale green with age. The flattened to umbonate cap is gray-green here but is variable in color and lacks the streaking of *Tricholoma portentosum* (below) and *T. sejunctum* (p.63). Its surface is greasy when damp, becoming scaly when dry.

• **OCCURRENCE** Mycorrhizal with deciduous trees, it is also found with conifers. Widespread throughout northern temperate zones.

FRUITING Singly or in troops on a variety of soils.

Dimensions CAP ⇹ 4–10cm | STEM ↕ 4–10cm ↔ 1–3cm	Spores White	Edibility

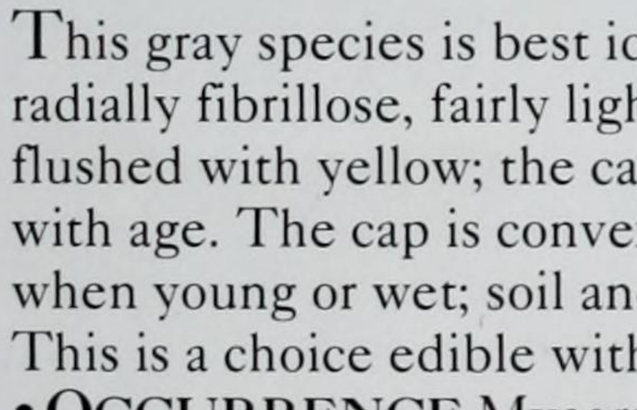
Family TRICHOLOMATACEAE	Species *Tricholoma portentosum*	Season Autumn–late autumn

STICKY GRAY TRICH

This gray species is best identified by the combination of a shiny, radially fibrillose, fairly light gray cap and a gray stem that is flushed with yellow; the cap margin and the gills may stain yellow with age. The cap is convex, becoming umbonate, and is sticky when young or wet; soil and debris may adhere to the surface. This is a choice edible with a yeasty taste and smell.

• **OCCURRENCE** Mycorrhizal with conifers. Widespread and relatively common in northern temperate zones.

• **SIMILAR SPECIES** The cap of *Tricholoma sejunctum* (p.63) has green or brown hues.



FRUITING Singly or in troops, often on sandy soil.

Dimensions CAP ⇹ 5–12cm | STEM ↕ 5–10cm ↔ 1–3cm	Spores White	Edibility

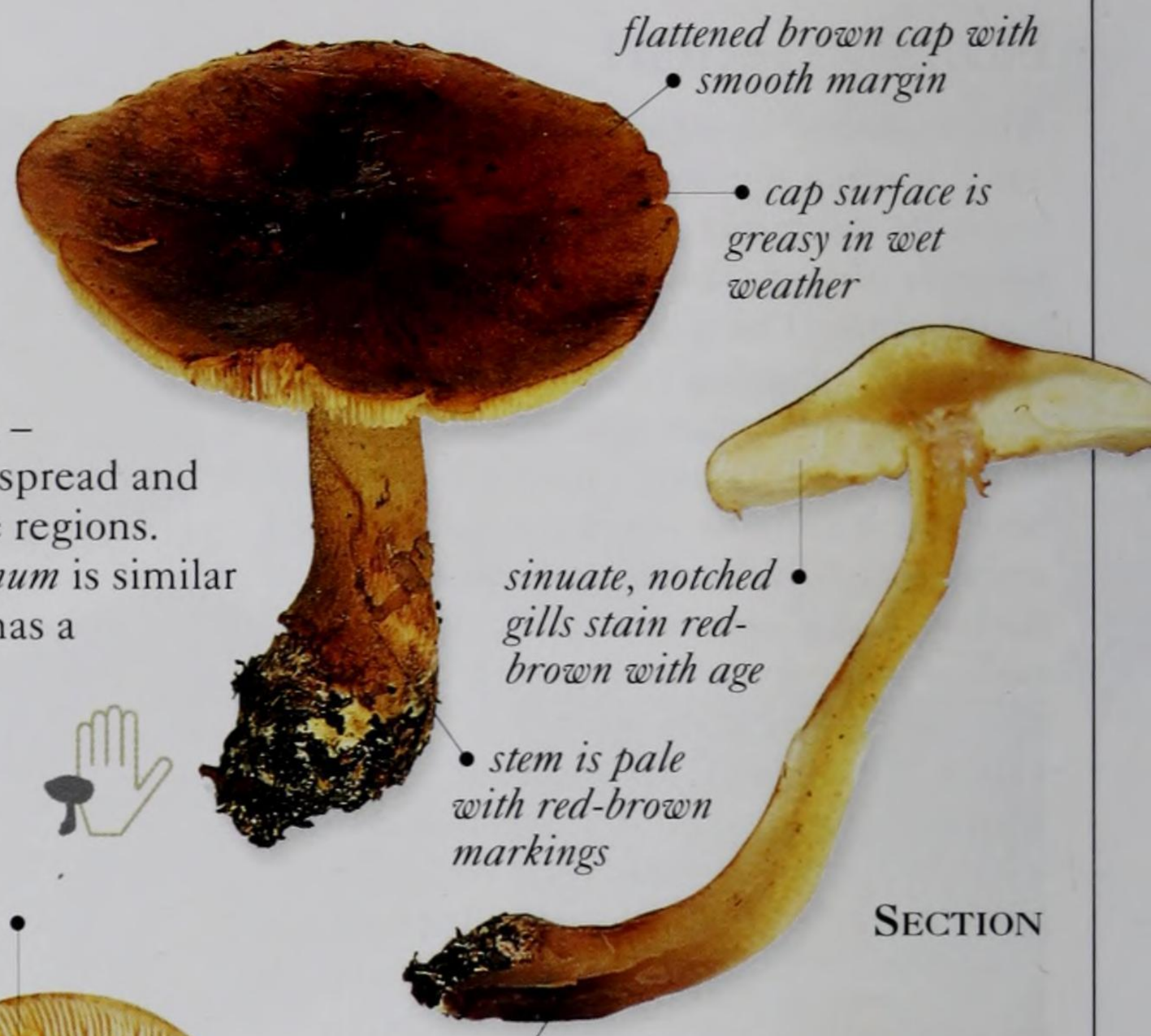
Family TRICHOLOMATACEAE	Species *Tricholoma ustale*	Season Autumn–late autumn

BURNT TRICH

This species lacks unique identification features. The convex then flat brown cap is greasy when wet; the stem is pale brown with red-brown marking; and the off-white gills stain red-brown with age.

• **OCCURRENCE** Mycorrhizal with deciduous trees on neutral to alkaline soil – often found with beech on rich soil. Widespread and common throughout European temperate regions.

• **SIMILAR SPECIES** *Tricholoma populinum* is similar but occurs with poplar trees. *T. ustaloides* has a distinct pale zone at the top of the stem.



△ *TRICHOLOMA AURANTIUM* Mainly found with conifers, this species is orange with white showing on the stem. The cap may be sticky or almost velvety, depending on the weather.

FRUITING Appears singly or in troops of fruitbodies.

Dimensions CAP ⟷ 3–10cm | STEM ↕ 4–10cm ↔ 0.5–2cm	Spores White	Edibility

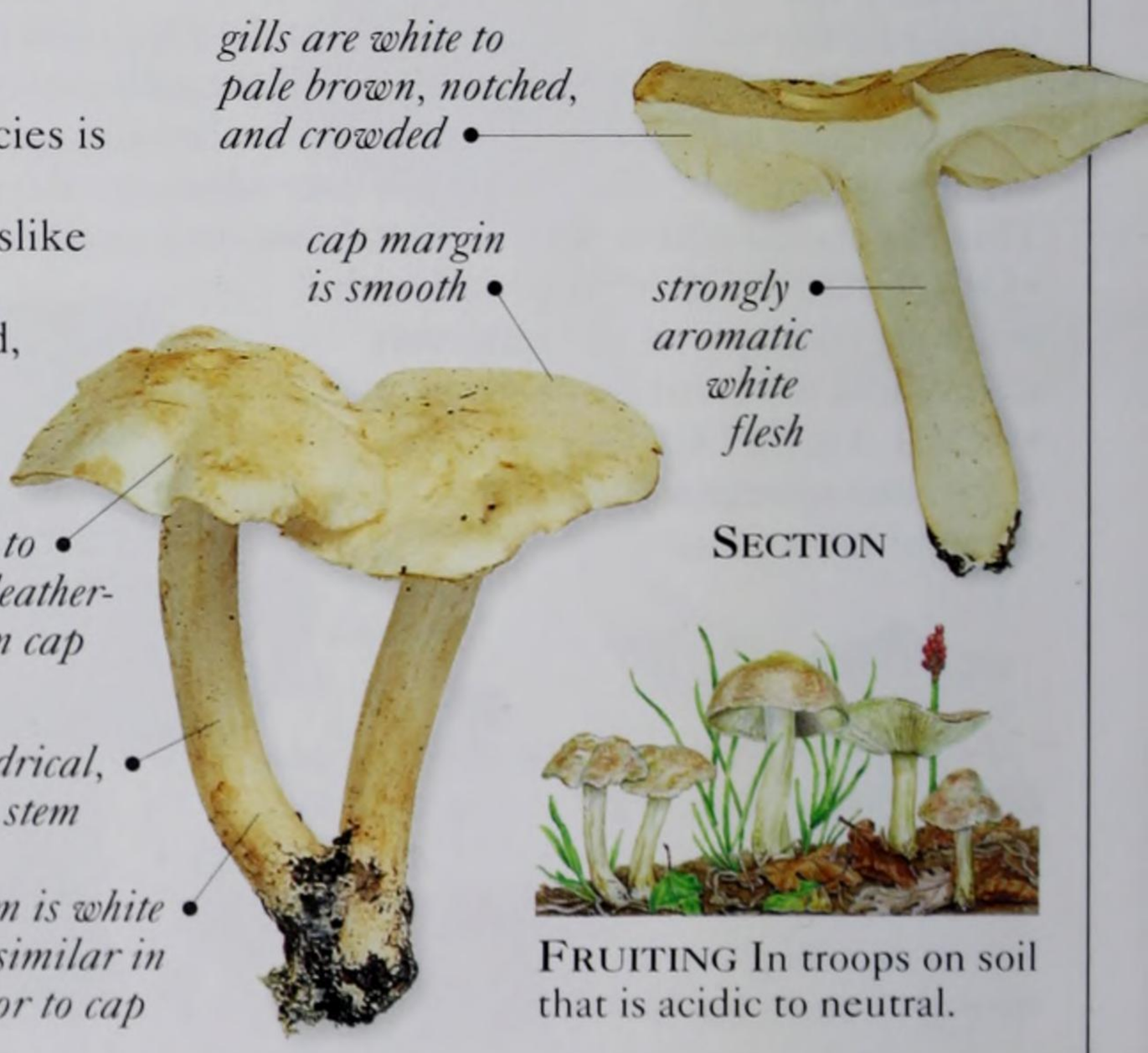
Family TRICHOLOMATACEAE	Species *Tricholoma lascivum*	Season Autumn–late autumn

OAK TRICH

This small to medium-sized *Tricholoma* species is recognized by its preference for a particular habitat and then by its sweet or yeasty to gaslike smell, which some people find pleasant and others dislike. It has a convex then flattened, pale leather-brown cap and a solid, cylindrical, off-white stem that becomes pale brown. It may be poisonous.

• **OCCURRENCE** Mycorrhizal with oak, beech, and hornbeam in woodland. Widespread and common throughout Europe.

• **SIMILAR SPECIES** Among other pale *Tricholoma* species, *T. album* is almost pure white and found only with birch. *Calocybe gambosa* (p.58) occurs mostly in spring.



FRUITING In troops on soil that is acidic to neutral.

Dimensions CAP ⟷ 4–8cm | STEM ↕ 5–8cm ↔ 1–1.5cm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Tricholoma sejunctum*	Season Autumn

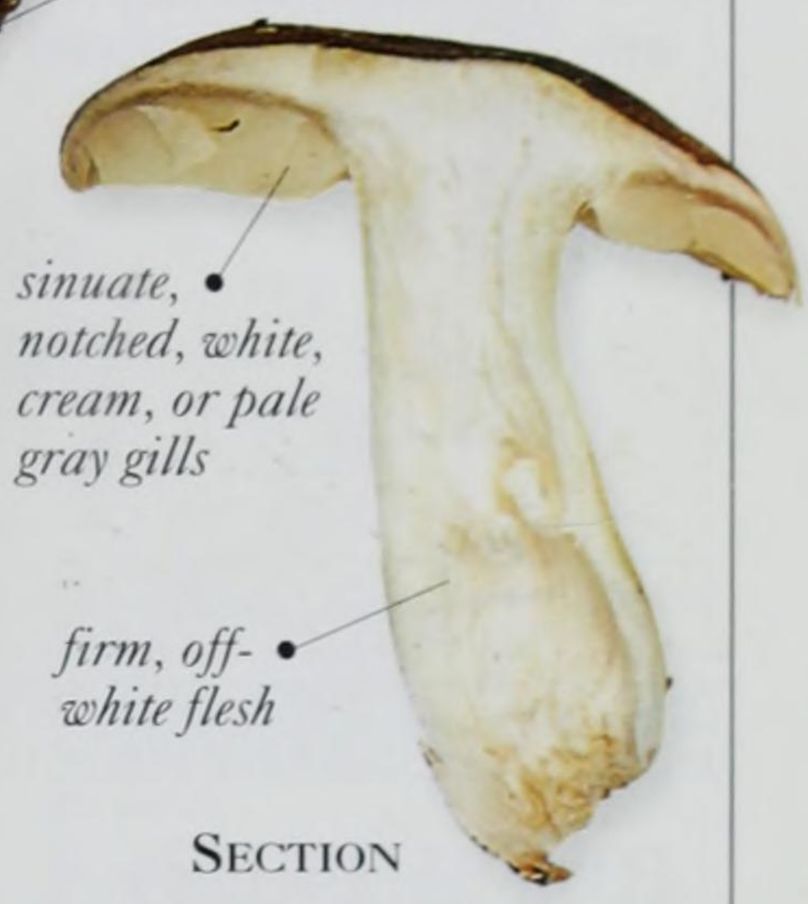
FALSE EDIBLE TRICH

The green or brown cap of this species is moist and domed, flattening with age. Its surface has dark fibrils and is greasy in wet weather. The white stem develops yellow flushes with age, and the flesh is off-white, tinted yellow under the cap skin. It causes nausea if eaten; see also SIMILAR SPECIES.

• **OCCURRENCE** Mycorrhizal with deciduous trees, such as beech, and conifers. It is found in woodland or large stands, usually on acidic soil; the beech form occurs on alkaline soil. Widespread throughout northern temperate regions.

• **SIMILAR SPECIES** *Tricholoma portentosum* (p.61). The poisonous *Amanita phalloides* (p.151) is distinguished by its volva, stem ring, and free gills.

FRUITING Appears in small groups or troops.



SECTION

Dimensions CAP ⊕ 5–10cm | STEM ↕ 5–8cm ↔ 1–1.5cm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Tricholoma flavovirens*	Season Autumn–early winter

EDIBLE YELLOW TRICH

There are several forms of this species, which is also known as *Tricholoma auratum* or *T. equestre*. They are all yellow, with an expanded convex cap and pale yellow stem, but differ in fruitbody size, being slender or more robust depending on location. The flesh is a whitish yellow and has a faint to strong yeasty smell, differing in the various forms and strongest in the form associated with pine (shown here). It is a choice edible, but the pine form can be difficult to clean because it is ingrained with grit.

• **OCCURRENCE** Mycorrizal: robust forms occur in pine woods; slender forms are mostly found under spruce and aspen. Widespread and fairly common throughout northern temperate zones.

FRUITING In troops; different forms are found with pine, on sandy soil, or with spruce or aspen.

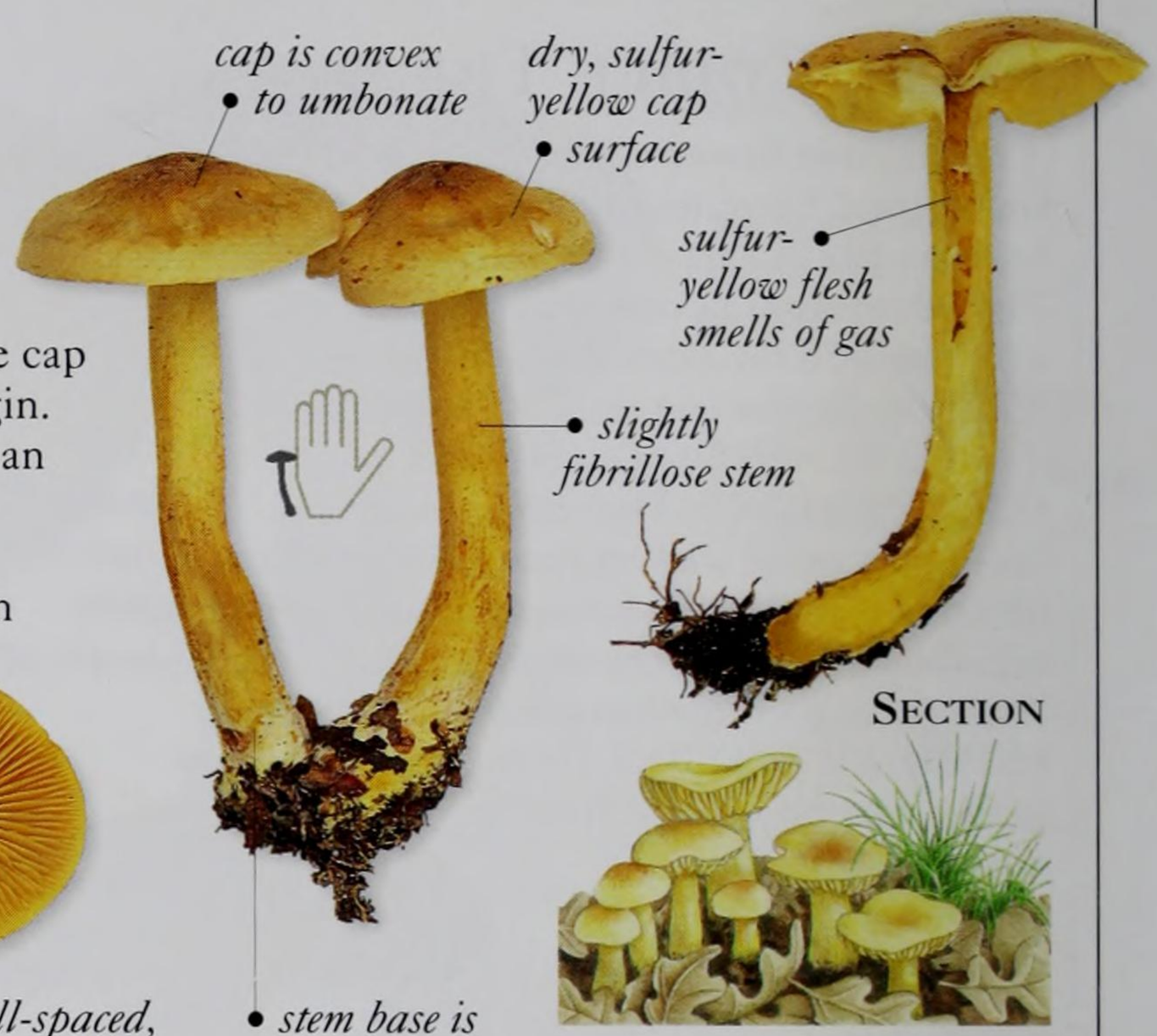
Dimensions CAP ⊕ 5–14cm | STEM ↕ 5–10cm ↔ 1.5–2.5cm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Tricholoma sulphureum*	Season Autumn–late autumn

POISON GAS TRICH

This poisonous species can be recognized instantly by its sulfur-yellow fruitbody and the nauseating smell it exudes. The smell, like that of a gasworks, is produced by a chemical compound called scatol. The cap is convex to umbonate with a smooth margin. The stem surface is slightly fibrillose with an off-white base that may be swollen. Some mycologists distinguish a smaller species, *Tricholoma bufonium*, which has a red-brown cap center and a similar smell.

• **OCCURRENCE** Mycorrhizal with conifers and deciduous trees. Widespread in northern temperate zones.



SECTION

FRUITING Appears singly or in troops of fruitbodies.

Dimensions CAP ⇔ 2–8cm | STEM ↕ 4–10cm ↔ 0.5–2cm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Tricholoma fulvum*	Season Autumn

BIRCH TRICH

This tall species is best identified by its warm orange-brown coloring and bitter-tasting, bright yellow flesh. It has a yeasty smell. The cap is convex with an umbo and a furrowed margin. Its pale yellow gills, which become brown-spotted with age, are sinuate and notched – typical of *Tricholoma* species. It may be poisonous.

• **OCCURRENCE** Mycorrhizal with birch trees and possibly with spruce. Widespread throughout northern temperate zones.

• **SIMILAR SPECIES** *Tricholoma albobrunneum*, found under conifers, has flesh that is white or brown-tinged. *T. ustale* (p.62).

FRUITING Appears in troops, mostly on damp ground.

Dimensions CAP ⇔ 4–10cm | STEM ↕ 7–15cm ↔ 1–2.5cm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Melanoleuca polioleuca*	Season Autumn

BLACK AND WHITE TRICH

This species has an umbonate, dark gray-brown cap and a mealy, dark stem, contrasting with the white to pale gray gills. The white flesh stains very dark brown from the stem base upward. With its indistinct smell and taste, it is not worth eating.

• **OCCURRENCE** On soil; found in large numbers in gardens, parks, and along roadsides. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *Melanoleuca melaleuca*, once regarded as the same species, is now considered to be a rarer member of the genus. It grows mostly with pine. There are many other similar *Melanoleuca* species.

FRUITING In troops on soil that has been disturbed.

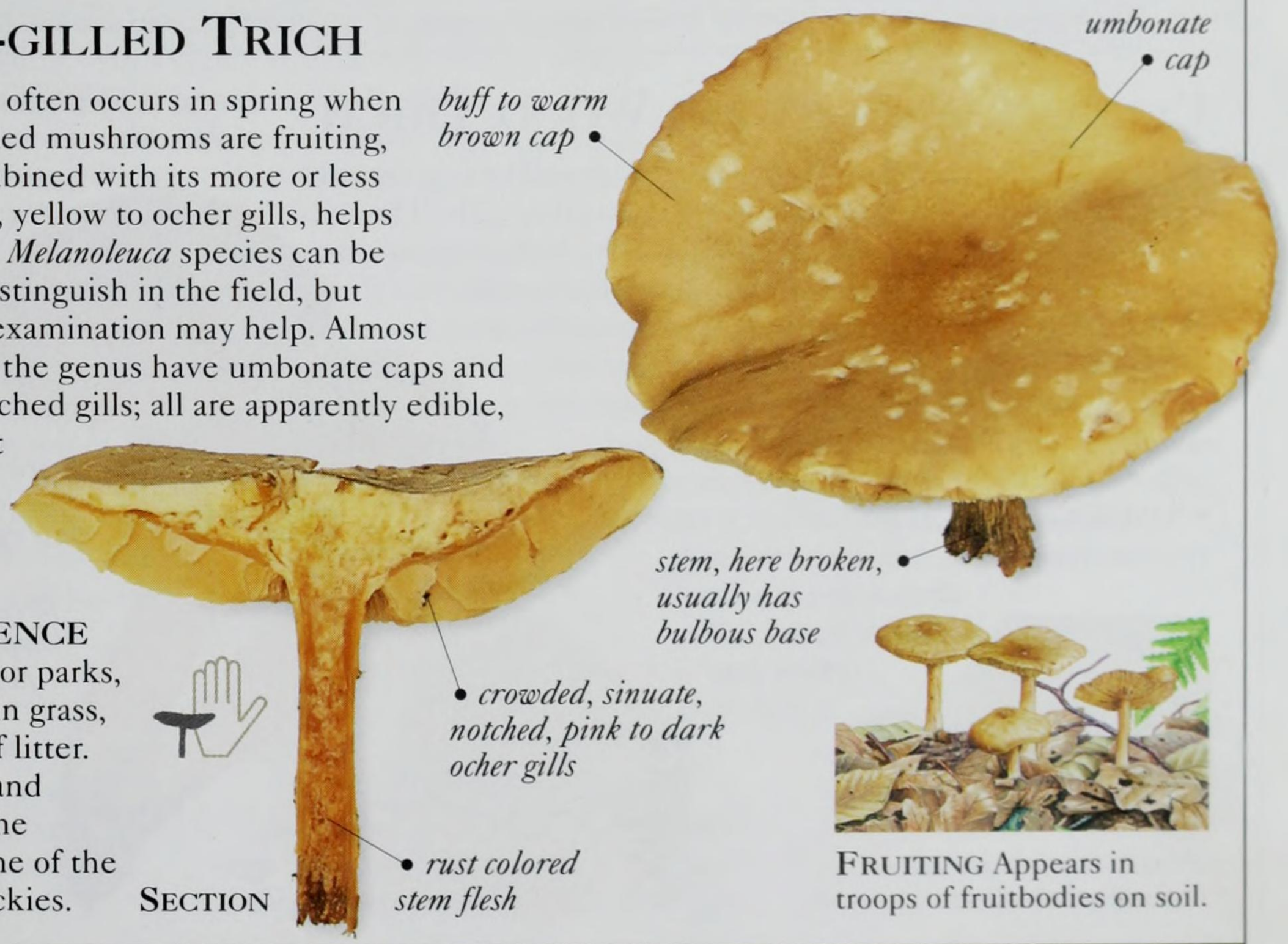
Dimensions CAP ⟷ 4–7cm | STEM ↕ 3–8cm ↔ 0.5–1cm	Spores Very pale cream	Edibility

Family TRICHOLOMATACEAE	Species *Melanoleuca cognata*	Season Spring–autumn

OCHER-GILLED TRICH

This species often occurs in spring when few other gilled mushrooms are fruiting, and this, combined with its more or less pink-flushed, yellow to ocher gills, helps to identify it. *Melanoleuca* species can be difficult to distinguish in the field, but microscopic examination may help. Almost all species in the genus have umbonate caps and narrowly attached gills; all are apparently edible, or at least not poisonous, but are not worthwhile for cooking.

• **OCCURRENCE** In woodland or parks, on bare soil, in grass, or among leaf litter. Widespread and frequent in the spruce-fir zone of the Colorado Rockies.



FRUITING Appears in troops of fruitbodies on soil.

Dimensions CAP ⟷ 5–12cm | STEM ↕ 3–8cm ↔ 0.5–1.2cm	Spores Cream	Edibility

Family TRICHOLOMATACEAE	Species *Megacollybia platyphylla*	Season Spring-summer

BROAD-GILLED COLLYBIA

The mid- to pale brown cap of this species is convex to umbonate, with broad gills, and the pale brown stem has longitudinal fibers. At the stem base, thick stringlike rhizoids spread wide and deep into the substrate. Known in North America as *Tricholomopsis platyphylla*, it causes gastric upsets.

• **OCCURRENCE** On buried deciduous branches and stumps; often appears to be fruiting on leaf litter or growing on rotten deciduous stumps. Widespread and common throughout northern temperate zones.

• **SIMILAR SPECIES** *Pluteus cervinus* (p.171) has free gills and a salmon-pink spore print.

FRUITING Singly or in small groups connected by rhizoids.

Dimensions CAP ⟷ 6–15cm | STEM ↕ 5–12cm ↔ 1–2.5cm	Spores Pale cream	Edibility

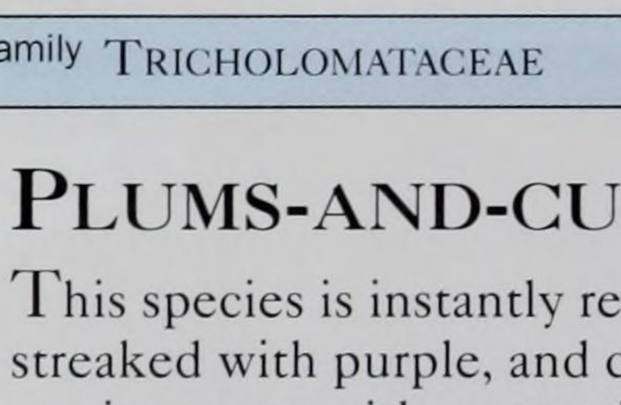
Family TRICHOLOMATACEAE	Species *Tricholomopsis rutilans*	Season Late summer–late autumn

PLUMS-AND-CUSTARD WOOD TRICH

This species is instantly recognizable by its yellow cap, heavily streaked with purple, and contrasting egg-yellow gills. The cap is convex with a central depression. The hollow stem is powdery with fine, purple to purple-yellow scales.

• **OCCURRENCE** Unlike the similar mycorrhizal *Tricholoma* species, *T. rutilans* causes decay in conifers. It is found in woodlands and large stands of conifers or pine. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *T. decora*, a rarer species in most regions, lacks the red shades and has fine black hairs on the yellow cap.



FRUITING In small clusters of fruitbodies on rotten wood.

Dimensions CAP ⟷ 5–10cm | STEM ↕ 4–10cm ↔ 1–2.5cm	Spores White	Edibility

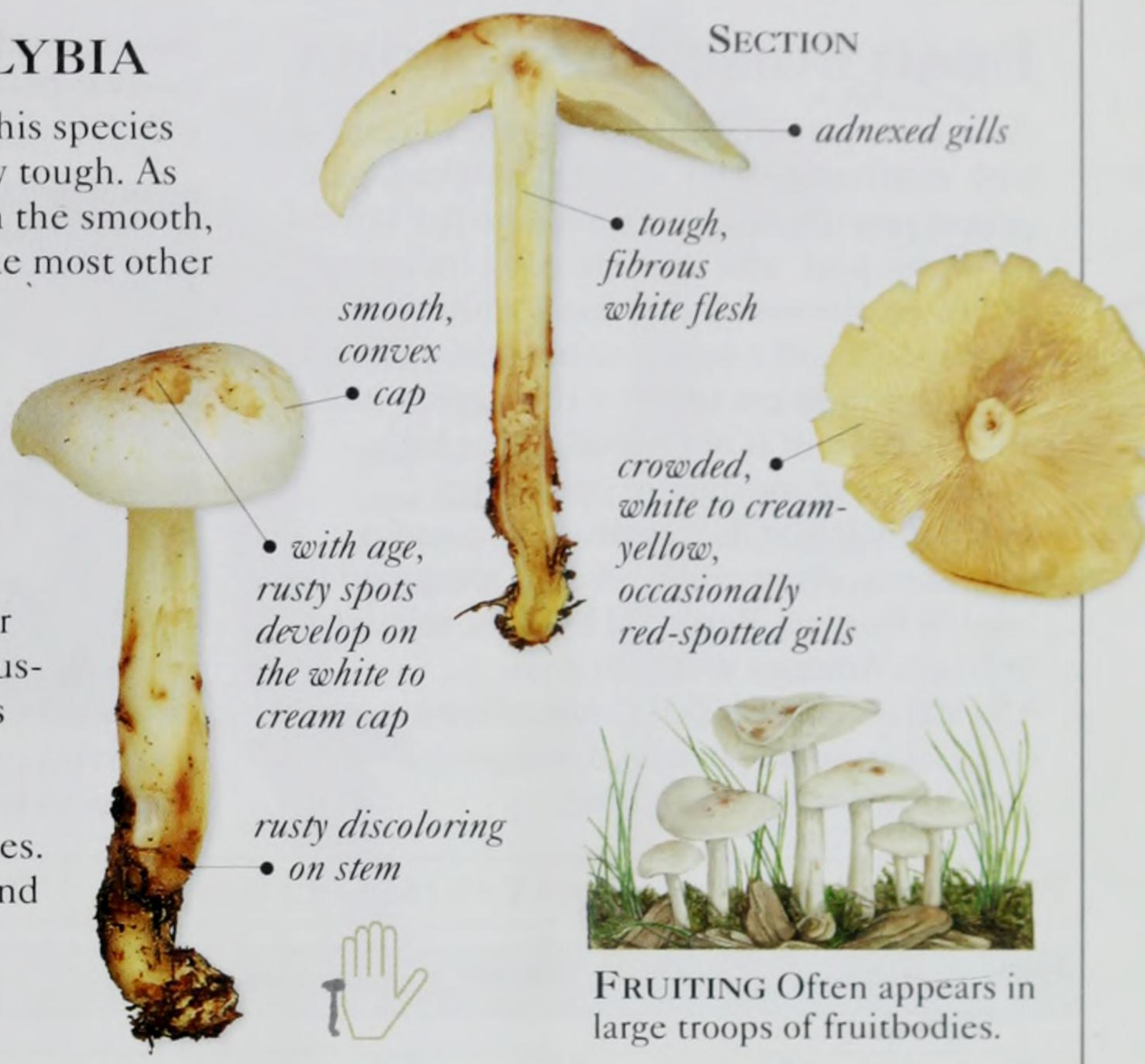
Family TRICHOLOMATACEAE	Species *Collybia maculata*	Season Autumn

RUST-SPOTTED COLLYBIA

On emergence, the fruitbodies of this species are pure white to off-white and very tough. As they mature, rusty spots develop on the smooth, convex cap and the stem. It is unlike most other *Collybia* species and more akin to *Tricholoma* species (p.59–64) in stature. This, together with its cream-orange spore deposit, has led to proposals that the genus *Rhodocollybia* be reinstated for it and a few other similar species.

• **OCCURRENCE** In woods, under conifers or deciduous trees on humus-rich, acidic soil. It can produce mass fruitings, making it difficult to find anything else. It is widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *C. distorta* and *C. prolixa* are similar in stature but have darker caps. *Tricholoma album* has softer, strong-smelling flesh.



FRUITING Often appears in large troops of fruitbodies.

Dimensions CAP ⊕ 4–10cm | STEM ↕ 6–12cm ↔ 1–2.5cm	Spores Cream-orange	Edibility

Family CORTINARIACEAE	Species *Hebeloma crustuliniforme*	Season Summer–autumn

POISON PIE HEBELOMA

This species has a convex, somewhat fleshy, buff cap. The stem is off-white with a mealy surface and widens toward the base. Drops of clear liquid exude from the edges of the gills; mature spores are trapped in the drops, making dark spots at the gill edges. The thick white flesh of this poisonous mushroom smells of radishes.

• **OCCURRENCE** Mycorrhizal with conifers and deciduous trees, in parks and woods. It and close relations are widespread and common in northern temperate zones.

• **SIMILAR SPECIES** Related species, such as *Hebeloma edurum*, *H. leucosarx*, and *H. sinapizans*, have a similar smell of radishes or sometimes a hint of cocoa, and are distinguished by spore size and shape, their reactions in iodine reagents, and subtle differences in size, cap color, and ecology.

FRUITING In troops or fairy rings, often among grass.

Dimensions CAP ⊕ 4–9cm | STEM ↕ 3–8cm ↔ 0.8–2cm	Spores Brown	Edibility

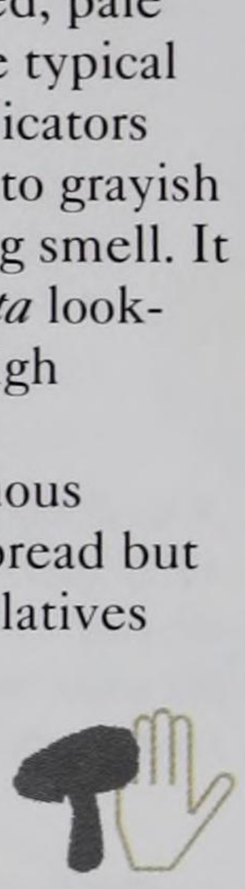
Family ENTOLOMATACEAE	Species *Entoloma sinuatum*	Season Autumn

LEAD POISON ENTOLOMA

A convex, pale gray-brown to ocher-cream cap with medium-spaced, sinuate, notched, pale yellow young gills, which become the typical *Entoloma*-pink with age, are good indicators of this mushroom. It also has a white to grayish cream stem and a yeasty to nauseating smell. It is important to get to know this *Lepista* look-alike because it is responsible for a high percentage of mushroom poisonings.

• **OCCURRENCE** In mature deciduous woodlands, often on clay soil. Widespread but local in Europe. Replaced by close relatives in North America and East Asia.

• **SIMILAR SPECIES** *Lepista irina* (p.57) is strongly perfumed, and its gray-brown stem is fibrillose.



sinuate, notched, medium-spaced gills

cap is pale gray-brown to ocher-cream

convex cap with central umbo

FRUITING Appears in small groups often under deciduous trees, such as oak or beech, in woods.

Dimensions CAP ⊕ 8–20cm | STEM ↕ 10–18cm ↔ 2–4cm	Spores Pale pink	Edibility ☠

Family ENTOLOMATACEAE	Species *Entoloma rhodopolium*	Season Autumn–late autumn

BEECH WOODS ENTOLOMA

This very varied species is difficult to identify. The gray or gray-brown cap is convex with an umbo, or slightly depressed. The gray stem is often long and slender with pale gray to pale brown flesh, odorless or smells of gas. The gaslike form is more slender and was once considered a separate species, *Entoloma nidorosum*. All forms are poisonous.

• **OCCURRENCE** In deciduous woodlands, especially beech woods, on rich soil. Widespread and locally common in northern temperate zones; world distribution unclear.

• **SIMILAR SPECIES** A number of similar species differ subtly in coloring and various microscopic characteristics.

broad, thick gills are sinuate and notched

cap margin may have radial striations

slender, silky gray stem with longitudinal fibers

soft, pale gray to pale brown flesh

SECTION

crowded, whitish gray then dirty pink gills

△ *ENTOLOMA CLYPEATUM*
This spring-fruiting species has a gray-brown cap, a brown-tinged, white stem, and sinuate, notched, pale gray gills aging to pink. 🍽

FRUITING Appears in troops among leaf litter.

Dimensions CAP ⊕ 4–12cm | STEM ↕ 6–15cm ↔ 0.5–2cm	Spores Dirty pink	Edibility ☠

Family ENTOLOMATACEAE	Species *Entoloma porphyrophaeum*	Season Summer–autumn

PURPLISH ENTOLOMA

Gray-purple coloring and a tall stature, along with a grassland habitat, make this species easily recognizable. The cap is umbonate, becoming conical with age. It has white flesh, with no distinctive smell, and may be poisonous.

• **OCCURRENCE** In unimproved grassland, often associated with Hygrophoraceae and Clavariaceae; also in alpine areas. Widespread but uncommon in Europe and eastern North America; it has suffered from the farming practice of using commercial fertilizer on pastures.

FRUITING Singly or in small groups of fruitbodies.

Dimensions CAP ⊕ 4–8cm | STEM ↕ 7–14cm ↔ 0.5–2cm	Spores Pale pink	Edibility

WITH COBWEBLIKE VEIL

SPECIES OF *CORTINARIUS*, which are featured in this subsection, are highly variable in size and shape. However, they all have a partial veil, resembling a fine spider's web, which protects the young gills. They also have rusty brown spore deposits, often seen as a rusty smudge on the veil remains.

Family CORTINARIACEAE	Species *Cortinarius bolaris*	Season Summer–autumn

MOTTLED POISON CORT

Distinctive red scales covering the cap and stem readily identify this species. A fairly short stem makes it look sturdy, and the fleshy cap is broadly convex with remains of the veil visible as fine threads at the margin. Thick, off-white flesh in the cap becomes yellow to orange toward the stem base.

• **OCCURRENCE** Mycorrhizal with deciduous trees, especially oak and birch, on acidic soil. Widespread and locally common in northern temperate zones in eastern North America.

FRUITING Mostly in small groups in mixed woods.

Dimensions CAP ⊕ 3–6cm | STEM ↕ 3–6cm ↔ 0.8–1.5cm	Spores Rusty brown	Edibility

Family CORTINARIACEAE	Species *Cortinarius pholideus*	Season Autumn

SCALY CORT

A brown-scaled cap and a long stem ringed with brown veil girdles characterize this web-cap. The cap is more or less convex when young, flat with a central umbo when mature. When young, the adnate gills are violet-blue; they age to violet-brown as the spores mature to rusty brown. A faint smell reminiscent of fresh tangerines exudes from the violet-tinged, pale brown flesh.

• **OCCURRENCE** Typically mycorrhizal with birch but may also be found with other trees in mixed woodlands. It prefers acidic soil. Widespread and quite common in northern temperate zones.

FRUITING Appears in small groups on mossy soil.

Dimensions CAP ⊕ 3–8cm | STEM ↕ 5–12cm ↔ 0.5–1cm	Spores Rusty brown	Edibility

Family CORTINARIACEAE	Species *Cortinarius semisanguineus*	Season Summer–autumn

POISON DYE CORT

The uniform red-brown coloring and blood-red gills are the best aid to identification of this species. It has a convex, olive- to red-brown cap, becoming umbonate with age; the paler stem exhibits threadlike veil remnants. The flesh of the cap is a paler red-brown than that of the stem. The Poison Dye Cort is an excellent source of a dye used for coloring wool.

• **OCCURRENCE** Almost exclusively mycorrhizal with conifers, it is often abundant under young spruce trees in large stands. Widespread in northern temperate zones.

• **SIMILAR SPECIES** *Cortinarius phoeniceus* has a redder cap and more distinct red veil girdles around the stem.

FRUITING In troops under conifers, often in moss.

△ *CORTINARIUS CINNAMOMEUS* This close relative occurs with deciduous trees and conifers. It has orange or orange-yellow gills aging to cinnamon-brown.

Dimensions CAP ⊕ 2–7cm | STEM ↕ 4–10cm ↔ 0.5–1cm	Spores Rusty brown	Edibility

Family CORTINARIACEAE	Species *Cortinarius paleaceus*	Season Summer–autumn

GERANIUM CORT

Fine, white to off-white veil scales on an umbonate or pointed, dark brown cap and a geranium-like fragrance (*Pelargonium*) help identify this species. On some specimens, the scales are almost absent, or the cap margin may be striate. The margin usually also displays veil remnants, and the slender stem has a thin ring and often white veil bands (forms with lilac on the stem are sometimes distinguished as a separate species called *Cortinarius paleifer*). The widely spaced gills, which may be violet-tinged when young, age to cinnamon-brown.

• **OCCURRENCE** Mycorrhizal mainly with conifers in damp woods, but also found under deciduous trees in a wide range of woodland habitats. Widespread in northern temperate zones.

• **SIMILAR SPECIES** There is a wide range of similar but not very distinctive small *Cortinarius* species.

FRUITING In troops, often among moss and pine litter.

Dimensions CAP ⊕ 1–3cm | STEM ↕ 4–7cm ↔ 3–5mm	Spores Rusty brown	Edibility

Family CORTINARIACEAE	Species *Cortinarius violaceus*	Season Summer–autumn

EDIBLE CORT

A deep violet-blue coloring sets this species apart. The convex to umbonate cap has fine radial fibers, and the stem bears the cobwebby remains of the veil on top of longitudinal fibers. The thick, broad gills are adnexed and become violet-brown as the spores mature. There are two forms, distinguished by their mycorrhizal associations (see OCCURRENCE). The scaly-capped, dark violet Corts are the only safe edibles in this genus in North America.

• **OCCURRENCE** Mycorrhizal with conifers and deciduous trees; the coniferous form may be a separate species, *Cortinarius hercynicus*. Widespread but local in northern temperate zones.

FRUITING In small groups in damp woods or by bogs.

Dimensions CAP ⊕ 6–15cm | STEM ↕ 6–14cm ↔ 1–2.5cm	Spores Rusty brown	Edibility

Family CORTINARIACEAE	Species *Cortinarius armillatus*	Season Summer–autumn

RED-BANDED CORT

This web-cap has a large, thick-fleshed, convex, orange-brown cap, the surface of which is covered with fine fibers. The tall, sturdy stem is girdled with prominent cinnamon-red veil remains. The cap margin also bears the remains of the veil.

• OCCURRENCE Mycorrhizal with birch and possibly other trees, in damp woods and boggy areas. Widespread and rather common in northern temperate zones.

• SIMILAR SPECIES *Cortinarius paragaudis* is slightly smaller, with stem girdles of a more dirty red. It is associated with conifers.

FRUITING Appears in troops or a few together.

Dimensions CAP ⟷ 5–12cm | STEM ↕ 7–15cm ↔ 1–3cm	Spores Rusty brown	Edibility

Family CORTINARIACEAE	Species *Cortinarius rubellus*	Season Summer–autumn

DEADLY CONIFER CORT

This deadly poisonous mushroom, which smells of radishes, is reddish orange with a pointed, umbonate cap covered with fibrils. The cylindrical to club-shaped, orange-brown stem has pale yellow to ocher bands indicating the veil remnants. The medium-spaced, adnexed to adnate gills are pale ocher-brown, darkening to deep rust-brown with age.

• OCCURRENCE Mycorrhizal, mostly with coniferous trees, on acidic soil. Widespread and locally common in Europe and parts of Asia.

• SIMILAR SPECIES *C. limonius*, also poisonous, has more vivid orange coloring. *C. orellanus* (p.73) has a less conical cap and grows near deciduous trees.

FRUITING Appears singly or in troops of fruitbodies on acid soil.

Dimensions CAP ⟷ 3–8cm | STEM ↕ 5–11cm ↔ 0.8–1.5cm	Spores Rusty brown	Edibility

Family CORTINARIACEAE	Species *Cortinarius orellanus*	Season Autumn

DEADLY CORT

This deadly poisonous species has an umbonate to flattened, red-brown cap with a strongly fibrillose surface. The thick, adnexed to adnate gills are rusty yellow and well spaced, whereas the cylindrical stem is pale yellow-brown. The stem also bears darker, threadlike traces of the universal veil, but it has no girdles, unlike *Cortinarius rubellus* (p.72). Ingestion of this deadly mushroom causes severe kidney damage; the symptoms typically appear a long time after eating.

• **OCCURRENCE** Mostly associated with deciduous trees, such as oak, on acidic soils. Widespread in warm-temperate parts of Europe; absent from North America.

FRUITING Appears mainly in small groups of fruitbodies on acid soil under deciduous trees.

Dimensions CAP ⟷ 3–6cm | STEM ↕ 4–9cm ↔ 1–2cm	Spores Rusty brown	Edibility ☠

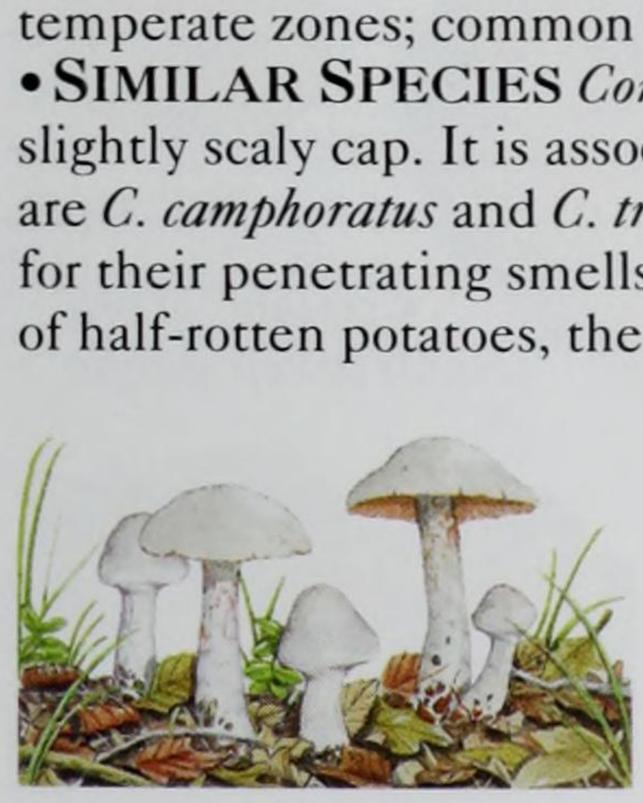
Family CORTINARIACEAE	Species *Cortinarius alboviolaceus*	Season Autumn

SILVERY VIOLET CORT

This species has a convex to umbonate, fleshy, silvery violet cap. The twisted, often club-shaped stem is also silvery violet and is sometimes marked rust-brown around the veil zone by deposited spores. The rather broad, sinuate, notched gills are medium spaced and light gray-blue to cinnamon-brown.

• **OCCURRENCE** Mycorrhizal, usually with deciduous trees, but also found with conifers, often on acidic soil. Widespread in northern temperate zones; common in eastern North America.

• **SIMILAR SPECIES** *Cortinarius malachius* has a slightly scaly cap. It is associated with conifers, as are *C. camphoratus* and *C. traganus*, which are noted for their penetrating smells: the former reminiscent of half-rotten potatoes, the latter sweet and sickly.



FRUITING Singly or in small groups in leaf litter.

Dimensions CAP ⟷ 5–8cm | STEM ↕ 5–12cm ↔ 1–2cm	Spores Rusty brown	Edibility 🍽

Family CORTINARIACEAE	Species *Cortinarius torvus*	Season Autumn–late autumn

SHEATHED CORT

Comparatively pale coloring, along with a "stocking" on the stem and a fleshy cap with widely spaced gills, help identify this mushroom. The cap is bun-shaped and grayish brown, with white veil remnants (violet when young) at the margin, and radiating fibers on the surface. The buff-brown flesh may be tinged violet in the upper stem.

• **OCCURRENCE** Mycorrhizal with beech or pine, in woodlands on a variety of soil types. Widespread in Europe and eastern North America.

• **SIMILAR SPECIES** *Cortinarius subtorvus* is darker and grows with willow and the woody perennial Mountain Avens (*Dryas octopetala*) in mountain areas. There are several other similar species that differ mostly in coloring or in habitat preference.

SECTION

FRUITING Singly or a few together among leaf litter.

Dimensions CAP ⊕ 4–8cm | STEM ↕ 4–9cm ↔ 0.5–1.5cm	Spores Rusty brown	Edibility

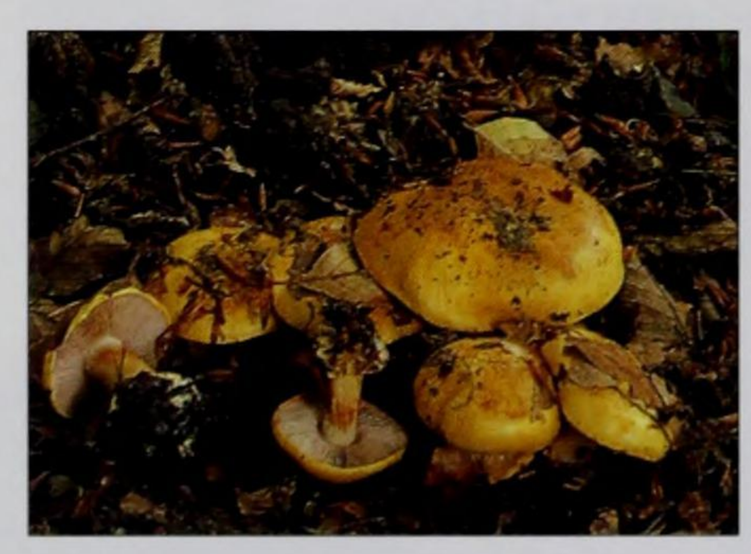
Family CORTINARIACEAE	Species *Cortinarius anserinus*	Season Autumn

PLUM-SCENTED CORT

This is a fleshy species with a convex, yellow-brown cap and a sturdy stem with a bulbous base. As its common name suggests, it smells of plums. It is inedible; the lilac to off-white flesh is mild tasting, but the cap skin is bitter.

• **OCCURRENCE** Mycorrhizal with beech on alkaline soil. Widespread and locally common in Europe. World distribution not clear.

• **SIMILAR SPECIES** A host of other related species, such as *Cortinarius calochrous* (below), occur in similar habitats.



△ *CORTINARIUS CALOCHROUS* This species has a yellow-green cap with a dark center, lilac gills, and a stem bulb. Both its flesh and its cap skin taste mild.

SECTION

FRUITING Appears singly or in small groups.

Dimensions CAP ⊕ 6–12cm | STEM ↕ 6–12cm ↔ 1–2.5cm	Spores Rusty brown	Edibility

Family CORTINARIACEAE	Species *Cortinarius triumphans*	Season Summer–autumn

YELLOW-BANDED CORT

This impressive species has a greasy, convex, orange-yellow cap, often with veil remnants at the margin, and prominent yellow veil girdles on the sturdy stem. The thick, yellow-cream flesh tastes bitter and has a faint, pleasant smell.

• **OCCURRENCE** Mycorrhizal with birch, in woods and on damp lawns in gardens and parks. Widespread but local in Europe and parts of Asia; reported in northeastern North America.

• **SIMILAR SPECIES** *Cortinarius cliduchus* has a darker cap and grows on alkaline soil among deciduous trees. *C. olidus* has a darker cap and a brown-olive veil. It smells strongly earthy and is not found with birch. *C. saginus* has a redder cap and is found growing among pines.

FRUITING In troops in grass under birch trees.

Dimensions CAP ⊕ 8–15cm | STEM ↕ 10–15cm ↔ 1–3cm	Spores Rusty brown	Edibility

Family CORTINARIACEAE	Species *Cortinarius mucosus*	Season Summer–autumn

ORANGE SLIME CORT

A fairly dark reddish to orange-brown cap, which is convex or has a wavy margin, and a sturdy white stem are good indicators of this species. Both the cap and the white stem are covered in the slimy remains of the veil. The flesh is thick and white, and the gills are gray- to cinnamon-brown.

• **OCCURRENCE** Mycorrhizal with two-needled pines, usually on sandy soil. Widespread and locally common in northern temperate zones.

• **SIMILAR SPECIES** *Cortinarius collinitus* occurs with spruce and has blue-tinged slime on its stem. Other similar species grow under different host trees.

FRUITING Singly or a few together beneath pines.

Dimensions CAP ⊕ 6–10cm | STEM ↕ 7–12cm ↔ 1–2.5cm	Spores Rusty brown	Edibility

Family CORTINARIACEAE	Species *Cortinarius sodagnitus*	Season Autumn

BITTER LILAC CORT

The convex cap of this species is bright violet, as is the slender stem, which has a prominent bulb at the base. The coloring becomes ocher-buff from the cap center with age. The cap skin is bitter tasting, but the flesh is mild; this mushroom is not recommended for eating.

• **OCCURRENCE** Mycorrhizal, mainly with beech trees. Widespread but locally common in northern temperate zones.

• **SIMILAR SPECIES** *Cortinarius dibaphus* is slightly larger and even more colorful. It has a similar distribution in northern temperate zones.

FRUITING Singly or a few together on calcareous soil.

Dimensions CAP ⊕ 4–10cm | STEM ↕ 6–10cm ↔ 0.5–1.5cm	Spores Rusty brown	Edibility

Family CORTINARIACEAE	Species *Cortinarius rufoolivaceus*	Season Autumn

RED AND GREEN CORT

This large species, belonging to the subgenus *Phlegmacium*, is identified by a unique color combination: its convex to umbonate cap is rich copper with rhubarb-pink or olive-green at the margin. The typically long, slender but bulbous stem is many-colored; the gills can be tinged olive-green or lilac. The white flesh is purple-tinged in the cap and upper stem.

• **OCCURRENCE** Mycorrhizal, especially with beech and oak trees. Widespread but local in Europe; not reported in North America.

• **SIMILAR SPECIES** Several other subgenus *Phlegmacium* species have olive coloring, including *Cortinarius atrovirens*, which has a fleshy, dark olive cap, a sulfur-yellow stem, and olive to rusty brown gills.

△ *CORTINARIUS CAERULESCENS* This fleshy species has a gray-blue cap and stem with white veil patches and purple gills. It ages to yellow-ocher.

FRUITING In small groups in leaf litter on soil.

Dimensions CAP ⊕ 6–10cm | STEM ↕ 7–12cm ↔ 1.5–2cm	Spores Rusty brown	Edibility

Family CORTINARIACEAE	Species *Cortinarius splendens*	Season Autumn

LOVELY POISON CORT

A striking species with a convex, wavy-margined yellow cap. The stem has fibrous, sulfur-yellow veil remains and a bulbous base. Potassium hydroxide (KOH) turns the yellow flesh reddish pink. This is a relatively small member of the *Phlegmacium* subgenus.

• **OCCURRENCE** Mycorrhizal, often with beech. Widespread and common in Europe; not reported in North America.

• **SIMILAR SPECIES** *Cortinarius citrinus* has a greenish yellow tinge. Similar-looking edible *Tricholoma* species (pp.63–4) have white spore deposits and lack the cobwebby veil.

FRUITING Singly or a few together on alkaline soil.

Dimensions CAP ⊕ 3–7cm | STEM ↕ 4–9cm ↔ 0.7–1.4cm	Spores Rusty brown	Edibility ☠

Family CORTINARIACEAE	Species *Cortinarius elegantissimus*	Season Autumn

ELEGANT CORT

The convex, orange-yellow cap of this species is greasy, as in other subgenus *Phlegmacium* species. The stem is yellow and smooth, although covered with threads remaining from the veil. The flesh is very pale yellow, with a blue tinge in the upper stem, darker yellow in the bulbous stem base. This fungus has a fruity smell and mild-tasting flesh and cap skin.

• **OCCURRENCE** Mycorrhizal with beech. Widespread but local in Europe; not reported in North America.

• **SIMILAR SPECIES** Other similar subgenus *Phlegmacium* species, including *Cortinarius aureofulvus* and *C. osmophorus*, differ in smell and taste, and in the amount of green in the cap.

FRUITING Singly or a few together on calcareous soil.

Dimensions CAP ⊕ 6–10cm | STEM ↕ 6–10cm ↔ 2–3cm	Spores Rusty brown	Edibility ☠

WITH STEM RING OR RING ZONE

THE FUNGI in this subsection have a veil that protects the young gills. As the cap expands to its mature size, the veil, or part of it, remains attached to the stem, either as a distinct ring around the stem or as a fibrillose zone. (See also pp.69–77 for species that have cobweblike veil remains.) Both the rings and the zones are often stained by falling spores, thus the true veil color can be difficult to see on mature specimens. Agarics from the mainly white-spored Tricholomataceae, and families with colored spores, including Strophariaceae, Cortinariaceae, and Coprinaceae, are featured here.

Family STROPHARIACEAE	Species *Pholiota aurivella*	Season Autumn, rarely spring

ONION-BAGEL PHOLIOTA

The convex to broadly umbonate, slimy, bright yellow cap of this species has a striking pattern of dark rust-brown veil scales, and its inrolled margin also bears veil remnants. The stem is also slimy and scaly. The inedible but pleasant-smelling flesh is very pale in the cap, darker in the stem.

• **OCCURRENCE** Typically found growing high in living but damaged deciduous trees, for example, where branches have been broken. It has a preference for beech trees, although it is also found on linden and willow. Widespread in northern temperate zones.

• **SIMILAR SPECIES** *Pholiota jahnii* has more upturned, black-tipped cap scales and smaller spores (5.5 x 3.5µm compared to 9 x 5.5µm for *L. aurivella*). *P. limonella* also has smaller spores (7 x 4.5µm).

FRUITING Appears in clusters of fruitbodies.

Dimensions CAP ⊕ 7–15cm | STEM ↕ 5–15cm ↔ 1–2cm	Spores Brown	Edibility

Family STROPHARIACEAE	Species *Pholiota squarrosa*	Season Autumn–early winter

DRY SCALY PHOLIOTA

This dry-skinned species has dense, upturned scales on its convex to umbonate cap. Veil remnants are visible at the cap margin. The pale yellow flesh smells of onions and, if eaten, can cause stomach upsets.

• **OCCURRENCE** Found in built-up areas as well as in woods, at the base of deciduous trees, such as elm and rowan. Widespread in northern temperate zones.

• **SIMILAR SPECIES** Smaller and paler *Pholiota squarrosoides* is highly sticky-slimy beneath the scales. It also occurs on deciduous trees but is rare in Europe, more common in North America. *Gymnopilus junonius* (p.83), found in the same habitat, lacks the distinctive cap scales.

FRUITING In clusters on living trunks or stumps.

Dimensions CAP ⟷ 5–15cm | STEM ↕ 6–15cm ↔ 1–2cm	Spores Brown	Edibility

Family TRICHOLOMATACEAE	Species *Oudemansiella mucida*	Season Autumn, rarely summer

EURO PORCELAIN MUSHROOM

This unmistakable species has a convex, thickly slimy, pale gray to ivory-white cap and a prominent gray to gray-brown ring on the off-white stem. Above the ring, the stem is dry; below, it is slimy and often gray. These features, combined with its habitat, make it easy to identify. It is edible but not worth eating.

• **OCCURRENCE** On beech or, more rarely, on oak. On living trees, it will often appear high up where the tree has been damaged, such as where a branch has been broken off. Widespread in northern temperate zones but absent in North America.

FRUITING In clusters or singly on standing or fallen trees.

Dimensions CAP ⟷ 2–15cm | STEM ↕ 3–8cm ↔ 0.3–1cm	Spores Pale cream	Edibility

Family TRICHOLOMATACEAE	Species *Armillaria mellea*	Season Autumn

HONEY MUSHROOM

This large agaric has a convex, flattened, or wavy, olive-tinged, pale yellow-brown cap with a darker center and sparse pale scales. There is a black, stringlike, luminescent mycelium on the host wood. The well-spaced, adnate gills begin white and become pink-brown, often with some dark spotting, with age. *Armillaria mellea* once included a range of species with similar features and they have now been reclassified separately (see *A. cepistipes*, below). The Honey Mushroom is collected in quantities as a popular fall edible even though it can cause stomach upsets.

• **OCCURRENCE** Found in woods, mainly with beech, often on fallen stumps and logs. Widespread but local in northern temperate zones.

FRUITING Almost always found growing in dense tufts with stems joined at the base.

Dimensions CAP ⟷ 3–10cm | STEM ↕ 8–10cm ↔ 1–2cm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Armillaria cepistipes*	Season Autumn

FINE-SCALY HONEY MUSHROOM

This species has a sturdy, fibrous stem, with a pendent, thin, white to pale gray ring, and a convex to umbonate, tawny to ocher cap with sparse, fibrous scales. The adnate gills are pale yellow to pale tan and well spaced. Scaly capped Honey Mushrooms are more apt to cause stomach upsets than the smooth capped species.

• **OCCURRENCE** Mostly with dead or dying deciduous trees, but also on conifers, in woods, parks, and gardens. Widespread; common in northern temperate zones; throughout Pacific Northwest.

• **SIMILAR SPECIES** The young cap of *A. gallica* has a pale center, and the stem ring is white to yellow. *A. ostoyae* has a thicker stem, turning brown from the base, a big, brown-edged ring, and coarser cap scales.

FRUITING Clustered or scattered near deciduous trees.

Dimensions CAP ⟷ 3–12cm | STEM ↕ 4–12cm ↔ 1–3cm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Tricholoma caligatum*	Season Late summer–autumn

BROWN MATSUTAKE

The convex to flat cap of this species has a brown-scaled, dry surface. The slender stem is white above the flaring ring and has brown veil zones and patches below. The flesh is white. The name actually encompasses a widespread complex of very similar mushrooms, which range from spicy-fragrant, choice edibles with a nutty flavor to forms that smell foul and are unpalatable.

• **OCCURRENCE** Found growing under deciduous trees, like oaks, in eastern North America; with conifers, like spruce, in the Rockies and Pacific Northwest; widespread and common across northern North America. Associated with atlas cedar (*Cedrus atlantica*) in parts of southern Europe and North Africa.

FRUITING Singly or a few fruitbodies together under deciduous and coniferous trees.

Dimensions CAP ⊕ 5–12.5cm | STEM ↕ 5–10cm ↔ 2–3cm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Tricholoma magnivelare*	Season Late summer–autumn

WHITE MATSUTAKE

This choice edible, with firm white flesh, has a distinctive smell of cinnamon and pine. Its convex white cap has an inrolled margin and is tacky when moist. It becomes flat with age and develops yellow to rusty brown scales and spots. A flaring ring sheaths the stem, which is white above the ring, aging light brown below it.

• **OCCURRENCE** Under conifers. Widespread and common across northern North America and in the south in the Rocky Mountains; most common on the Pacific Northwest coast.

• **SIMILAR SPECIES** *Amanita* species such as *A. smithiana* (p.148) lack the spicy smell and have free gills. They also have loose veil patches on their caps.

FRUITING Appear singly or in groups of a few fruitbodies together under coniferous trees.

Dimensions CAP ⊕ 5–20cm | STEM ↕ 5–15cm ↔ 2–4cm	Spores White	Edibility

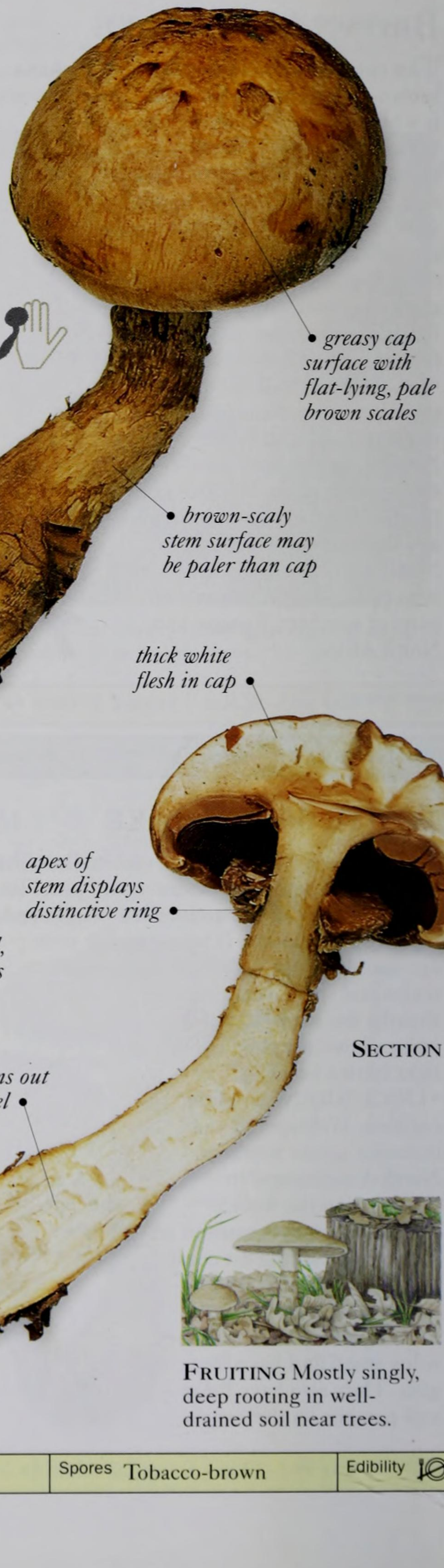
Family CORTINARIACEAE	Species *Hebeloma radicosum*	Season Autumn

ROOTING HEBELOMA

The convex, cream to pale yellow-brown cap of this large *Hebeloma* species is covered with distinct brown scales that lie flat against its surface (adpressed). The similarly scaly stem has a "root" that goes deep underground. The prominent stem ring is unusual in this genus. The firm white flesh has a strong smell of marzipan or bitter almonds and a bitter taste, both of which also help in its identification.

• **OCCURRENCE** Mycorrhizal with deciduous trees, it is associated with vole nests and latrines underground, in well-drained soil in woods. Widespread but uncommon in northern temperate zones; not reported in North America.

• **SIMILAR SPECIES** Some smaller, nonscaly *Hebeloma* species, including *H. pallidoluctuosum*, have a similar sweet smell. *Pholiota* species (pp.78–9, 91–2) are similar in appearance, but none smell of marzipan and all are associated with dead wood.



FRUITING Mostly singly, deep rooting in well-drained soil near trees.

Dimensions CAP ⟷ 5–12cm | STEM ↕ 6–20cm ↔ 1.5–2.5cm	Spores Tobacco-brown	Edibility

Family TRICHOLOMATACEAE	Species *Phaeolepiota aurea*	Season Summer–autumn

GOLDEN PHAEOLEPIOTA

This large, golden yellow agaric, which smells of bitter almonds, has a convex cap with a fringed margin and granular surface, and a flaring stem ring beneath which the stem is very wrinkled. The adnexed gills are crowded and off-white, becoming russet-brown. It is sometimes classified within the Cortinariaceae family due to its ocher-brown spore deposit. It is reported as edible but can cause stomach upsets.

• **OCCURRENCE** In woods, along bridle paths or in other disturbed sites; it prefers rich soil. Widespread and locally common in northern temperate zones; found in Pacific Northwest.

• **SIMILAR SPECIES** *Gymnopilus spectabilis* (below) occurs on rotting wood and has a streaked cap and stem.

FRUITING Appears in large groups of fruitbodies on nutrient-rich soil.

Dimensions CAP ⇹ 10–25cm | STEM ↕ 10–30cm ↔ 1.5–4cm	Spores Ocher-brown	Edibility

Family CORTINARIACEAE	Species *Gymnopilus spectabilis*	Season Autumn

BIG LAUGHING GYM

A tuft-forming habit, prominent stem ring, and threadlike veil at the margin of the convex to umbonate cap help to identify this variable mushroom. The cap is dry and orange-yellow with a thread-like veil at the margin; the fibrillose stem is a similar color but stained darker near the ring by falling spores. The fleshiest *Gymnopilus* species, it is bitter, inedible, and contains hallucinogens.

• **OCCURRENCE** Grows on rotten deciduous trees and stumps, rarely on conifers. Widespread in northern temperate zones.

• **SIMILAR SPECIES** The Honey Mushroom, *Armillaria mellea* complex (p.80), is similar in color, shape, and habitat. It has a white spore deposit and print.

FRUITING In tufts on dead wood, mostly at soil level.

Dimensions CAP ⇹ 5–15cm | STEM ↕ 5–15cm ↔ 1–3.5cm	Spores Rust-brown	Edibility

Family STROPHARIACEAE	Species *Psilocybe cubensis*	Season All year

SAN ISIDRO PSILOCYBE

This large *Psilocybe* species has a bell-shaped to umbonate, sticky, yellow-brown cap, the surface of which may be covered with small white scales – the remains of the veil. The stem is off-white with a pendent ring that soon becomes black from falling spores. The white to cream flesh bruises blue. The fairly crowded, adnate gills are purple-brown with white edges when mature. It is a hallucinogen.

• **OCCURRENCE** In subtropical to tropical grassland, where animals graze. Widespread and common in Caribbean and Gulf coastal areas of North America and elsewhere in the tropics. It has been introduced into Europe, where it can be cultivated.

• **SIMILAR SPECIES** *Panaeolus semiovatus* (p.95) does not stain blue.

FRUITING Appears singly or in small groups on cow and horse dung in grassland.

Dimensions CAP ⟷ 2–12cm | STEM ↕ 5–15cm ↔ 0.5–1.2cm	Spores Dark purple-brown	Edibility ☠

Family STROPHARIACEAE	Species *Psilocybe squamosa*	Season Autumn–late autumn

SCALY-STALKED PSILOCYBE

Short-lived, concentric cap scales and a distinctive stem ring characterize this large *Psilocybe* species. The umbonate cap is yellowish white with white-edged, gray or purple-brown to almost black gills; the stem is scaly and off-white, turning brown with age. It is not edible; the flesh has a slight aroma and a mild to slightly bitter taste.

• **OCCURRENCE** In woods, emerging from buried or half-buried deciduous debris, wood chips, or sawdust. Widespread and fairly common in northern temperate zones.

• **SIMILAR SPECIES** A varient found in northern North America is *P. thrausta*, which has a brick-red cap.

FRUITING Appears singly or in small groups.

Dimensions CAP ⟷ 2–5cm | STEM ↕ 10–15cm ↔ 3–5mm	Spores Purple-brown	Edibility 🍽

Family BOLBITIACEAE	Species *Agrocybe cylindracea*	Season Late spring–autumn

POPLAR AGROCYBE

This fleshy mushroom has a convex, ocher-tinged, white cap; as with most *Agrocybe* species, the smooth surface cracks in dry weather. The stem has a well-developed ring and is off-white, becoming brown with age. Widely cultivated and eaten in southern Europe, it has pale flesh with a rather strong, yeasty smell and taste.

• **OCCURRENCE** On or inside dead or pollarded willows and poplars. Widespread in warm northern temperate to subtropical zones.

• **SIMILAR SPECIES** *A. praecox* (below) grows on wood chips or in grass and is usually smaller.

SECTION

FRUITING Appears mostly in tufts but also singly.

Dimensions CAP ⟷ 6–15cm | STEM ↕ 8–15cm ↔ 1–3cm	Spores Clay-brown	Edibility

Family BOLBITIACEAE	Species *Agrocybe praecox*	Season Spring–summer

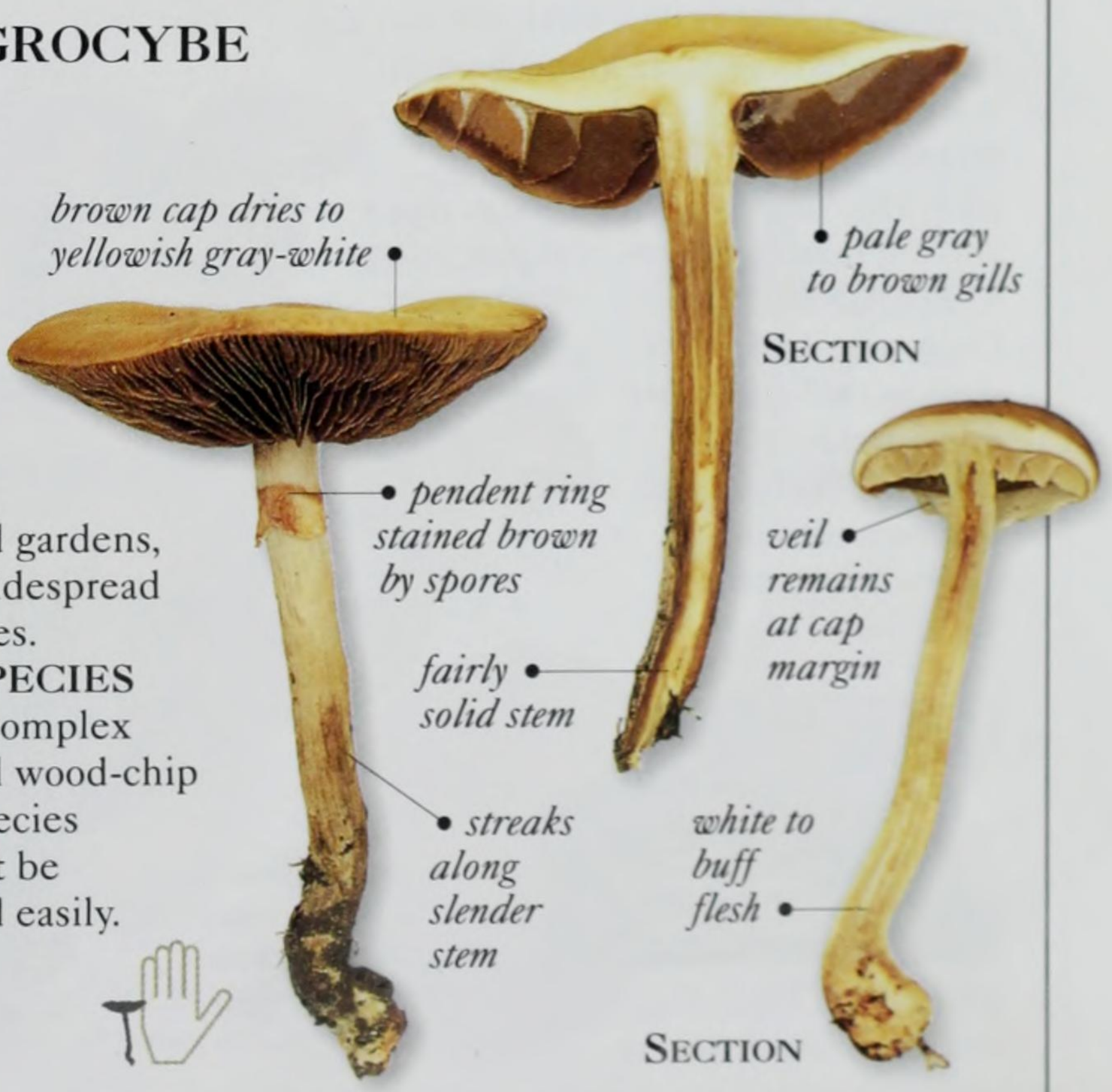
SPRING WOOD-CHIP AGROCYBE

This highly variable mushroom usually has a stem ring, but sometimes the veil is attached to the cap margin. The convex to umbonate cap dries very quickly from light brown to yellowish gray-white; its smooth surface may crack. The base of the stem may be swollen. The pale, yeasty-smelling flesh often has a bitter aftertaste.

• **OCCURRENCE** In woods, parks, and gardens, among rotting wood chips or in grass. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** There is a complex of grass and wood-chip *Agrocybe* species that cannot be recognized easily.

FRUITING Appears in small groups or troops of fruitbodies.



SECTION

SECTION

Dimensions CAP ⟷ 3–7cm | STEM ↕ 4–10cm ↔ 0.6–1cm	Spores Tobacco-brown	Edibility

Family STROPHARIACEAE	Species *Hypholoma capnoides*	Season Summer–autumn

CONIFER TUFT PSILOCYBE

The convex cap of this agaric is yellowish orange, drying to pale orange-brown, and has veil remnants visible at the pale margin. It is greasy when wet. The stem is pale yellow at the top and rusty brown at the bottom. This mushroom has mild-tasting, pale yellow flesh.

• **OCCURRENCE** One of the few agarics found almost all year, except in cold winters, on strongly decayed conifer stumps. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *H. radicosum* is much rarer but is found in similar sites. *Hypholoma*s and *Stropharia*s are now often called *Psilocybe*s.

FRUITING In clusters of fruitbodies or singly.

Dimensions CAP ⟷ 3–7cm | STEM ↕ 5–8cm ↔ 0.5–1cm	Spores Purplish brown	Edibility

Family STROPHARIACEAE	Species *Hypholoma fasciculare*	Season Summer–autumn

SULFUR TUFT PSILOCYBE

Greenish yellow gills and a tendency to cluster on dead wood are two characteristics of this familiar woodland agaric. It has a convex, pale yellow cap, often darker in the center, and a yellow stem. The remains of the white veil may be visible at the cap margin. The inedible, sulfur-yellow flesh smells earthy; a very hot, bitter taste is another identification mark. Species referred to as *Hypholoma* were until recently, *Naematoloma*s and are now *Psilocybe*s.

• **OCCURRENCE** On rotten deciduous stumps and upturned roots, rarely on conifers. Widespread and common in northern temperate zones.

FRUITING Appears in small and large clusters.

Dimensions CAP ⟷ 3–7cm | STEM ↕ 4–10cm ↔ 0.3–1cm	Spores Purplish brown	Edibility

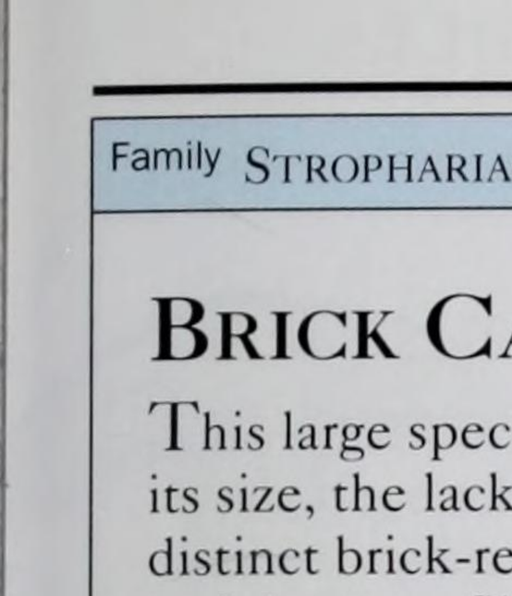
Family STROPHARIACEAE	Species *Hypholoma sublateritium*	Season Autumn–late autumn

BRICK CAP PSILOCYBE

This large species is best identified by its size, the lack of green in the gills, and the distinct brick-red cap color. The cap is convex and the stem fibrous and pale yellow at the top, reddish brown at the base. The yellow to reddish brown flesh has a pleasant odor and a nutty flavor when cooked.

• **OCCURRENCE** On deciduous stumps or roots, in woodland or parks. Widespread in eastern North America and other northern temperate zones.

• **SIMILAR SPECIES** A range of much smaller species, such as *H. udum* and *H. elongatum* occur in boggy places. *H. marginata* occurs in large troops on needle beds or on conifer remains.



young cap margin with white veil, stained black by spores

SECTION

FRUITING Appears in clusters of fruitbodies.

Dimensions CAP ⊕ 5–10cm | STEM ↕ 5–10cm ↔ 0.5–1.5cm	Spores Purplish brown	Edibility

Family CORTINARIACEAE	Species *Rozites caperata*	Season Summer–autumn

GYPSY ROZITES

Egg-shaped on emerging, the cap of this species becomes convex to umbonate with age. It is yellow-brown with a wrinkled surface and remnants of the white to lilac veil in the center. The smooth stem has a narrow, sheathing ring.

• **OCCURRENCE** Mycorrhizal and most commonly found with conifers but also occurs with deciduous trees, often beech. Widespread in some areas of northern temperate zones; local in eastern and northwestern North America.

• **SIMILAR SPECIES** *Cortinarius* species (pp.69–77) are related, but have no true stem rings and have rust-brown spores.

FRUITING Appears in troops or small groups on acidic soil.

SECTION

Dimensions CAP ⊕ 5–12cm | STEM ↕ 5–15cm ↔ 1–2cm	Spores Pale brown	Edibility

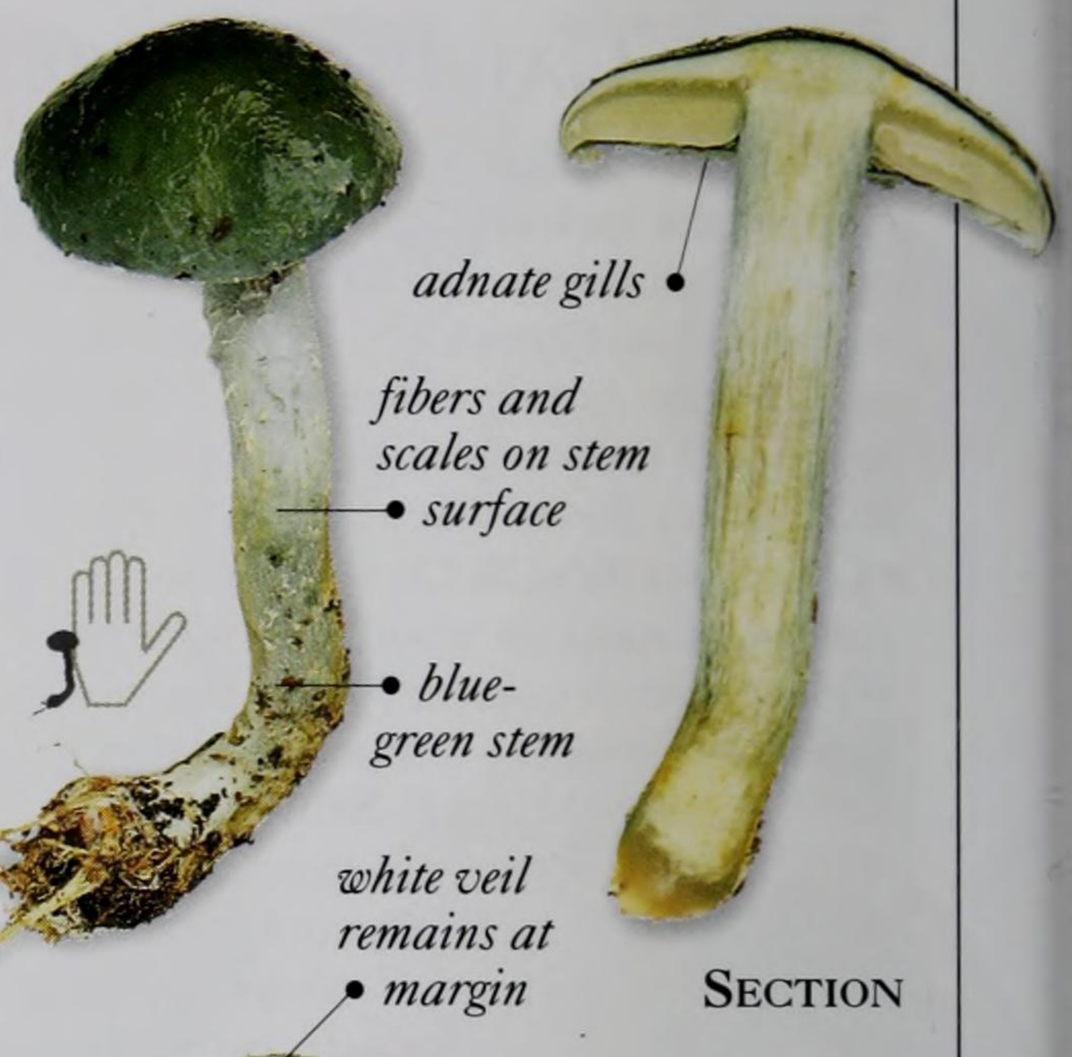
Family STROPHARIACEAE	Species *Stropharia cyanea*	Season Autumn

BLUE-GREEN PSILOCYBE

This mushroom is distinguished from other blue-green *Stropharia* species by its gills, which are not white edged. The convex, greasy cap is blue-green, soon fading and developing yellow spots. Its margin has pale veil remnants, but the ring on the scaly, fibrous, blue-green stem is inconspicuous. The off-white flesh has an indistinct smell. All *Stropharia*s and *Hypholoma*s are referred to by some as *Psilocybe*.

• **OCCURRENCE** Among leaf litter on fertile soil; often in European beech woods on alkaline soil.

• **SIMILAR SPECIES** *S. aeruginosa* has darker spores and gills with white edges. *S. pseudocyanea* smells of freshly ground black pepper.



FRUITING Appears in small groups or singly.

Dimensions CAP ⟷ 3–7cm | STEM ↕ 4–8cm ↔ 0.4–1cm	Spores Purplish brown	Edibility

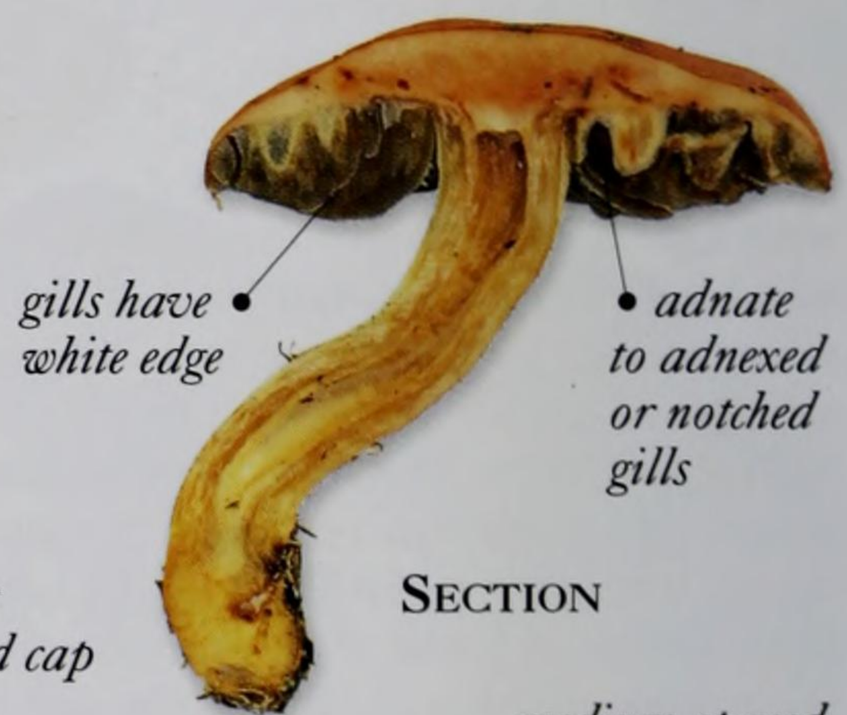
Family STROPHARIACEAE	Species *Stropharia aurantiaca*	Season Summer–autumn

RED-CAP PSILOCYBE

This is a distinctive species, best recognized by its sturdy, bright orange-capped fruitbodies and its occurrence on wood chips. The cap is convex then flat. The stem is off-white with a fibrous surface and is often hollow. The flesh is off-white, sometimes with an orange flush, and has an indistinct smell; its edibility is unknown.

• **OCCURRENCE** Mostly on decaying wood chips or sawdust mixed with soil. Widespread and spreading in Europe; reported from California.

• **SIMILAR SPECIES** An orange variety of *Psilocybe squamosa* (var. *thrausta*) has an umbonate cap and thinner flesh.



FRUITING In troops, often in mulched flowerbeds.

Dimensions CAP ⟷ 1.5–6cm | STEM ↕ 2–6cm ↔ 2–8mm	Spores Purplish brown	Edibility

Family STROPHARIACEAE	Species *Stropharia rugoso-annulata*	Season Spring and autumn

BURGUNDY CAPS

The smooth, dry cap of this species is red to tan, depending on its exposure to light. It is bell-shaped, becoming convex to flat with age. The off-white stem has a ring with dark lines above and coglike structures below. The stem base is widened or bulbous and has a conspicuous, cordlike white mycelium. The flesh is white and tastes good if eaten when young.

• **OCCURRENCE** In wood-chip mulch. Widespread in southern Europe, rare farther north; also found in North America.

• **SIMILAR SPECIES** *Stropharia aurantiaca* (p.88) is smaller and more bright orange-red. *Agaricus* species (pp.156–163) have free gills.

FRUITING In abundant troops in wood-chip mulch; it has two distinct fruiting seasons.

Dimensions CAP ⟷ 5–15cm | STEM ↕ 10–15cm ↔ 1–2cm	Spores Purplish gray-black	Edibility

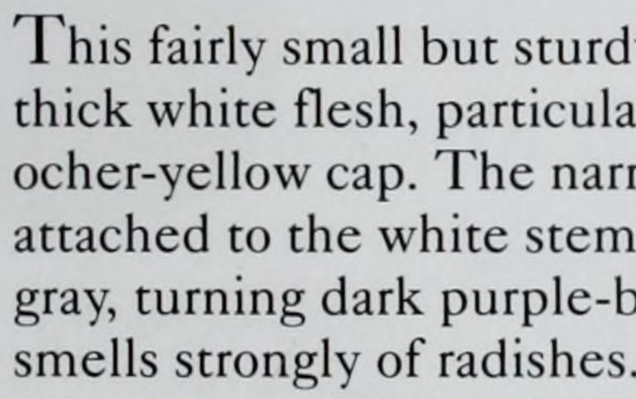
Family STROPHARIACEAE	Species *Stropharia coronilla*	Season Autumn

POISON LAWN PSILOCYBE

This fairly small but sturdy species has extremely thick white flesh, particularly in the convex, ocher-yellow cap. The narrow ring may be attached to the white stem. The gills are violet-gray, turning dark purple-brown. This species smells strongly of radishes. Recent reports suggest it could be poisonous.

• **OCCURRENCE** Common in grassy areas in drier situations, including gardens, parks, heathland, and sand dunes. Widespread in northern temperate zones.

• **SIMILAR SPECIES** Some forms, which have different spore sizes and coloring, are regarded as distinct species, including *Stropharia halophila* and *S. melasperma*.



FRUITING Singly or a few together in grass or on sandy soil.

Dimensions CAP ⟷ 1.5–6cm | STEM ↕ 2.5–4cm ↔ 0.4–1cm	Spores Dark purplish brown	Edibility

Family STROPHARIACEAE	Species *Stropharia semiglobata*	Season Late spring–autumn

DUNG PSILOCYBE

This elegant, slender species has a smooth, often hemispherical, light yellow cap and a long, slender, slimy, off-white stem. In common with many of its close relatives, its cap is greasy when wet, and it has an inconspicuous, tiny stem ring, which is frequently stained black by deposited spores. The inedible, thin, pale flesh has a yeasty smell.

• **OCCURRENCE** In grassland and pastures on old horse, cow, and sheep manure. A range of fungi fruit on herbivore dung at different stages of decay. Widespread in northern temperate zones and elsewhere.

• **SIMILAR SPECIES** *Stropharia umbonatescens* has a pimple or umbo at the cap center and basidia with only 2 spores; those of *S. semiglobata* have 4.

FRUITING Appears in small groups on dung.

Dimensions CAP ⇔ 0.5–4cm | STEM ↕ 2–8cm ↔ 2–5mm	Spores Purplish black	Edibility

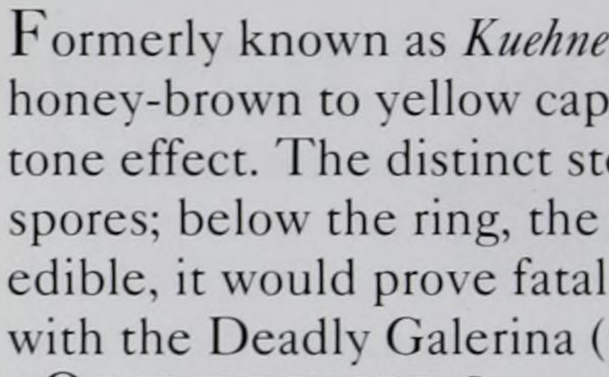
Family STROPHARIACEAE	Species *Galerina mutabilis*	Season Summer–autumn

SCALY-VEILED GALERINA

Formerly known as *Kuehneromyces mutabilis*, this species has an umbonate, honey-brown to yellow cap, which dries from the center, producing a two-tone effect. The distinct stem ring is often stained ocher-brown by falling spores; below the ring, the stem is covered with pointed scales. Although edible, it would prove fatal to confuse it with the Deadly Galerina (p.91).

• **OCCURRENCE** On rotten deciduous trees and, rarely, conifers, in deep woods. Widespread and common in western North America.

• **SIMILAR SPECIES** A group of poisonous *Galerina* species are similar: *G. unicolor* (p.91) and *G. marginata* have fibers and no stem scales.



FRUITING In dense troops of individual clusters.

Dimensions CAP ⇔ 2–7cm | STEM ↕ 3–7cm ↔ 0.4–1cm	Spores Ocher-brown	Edibility

Family CORTINARIACEAE	Species *Galerina unicolor*	Season Summer–winter, into spring

DEADLY GALERINA

The convex to broadly umbonate, wavy-margined cap of this species is rich brown; it changes to pale yellow-brown as it dries. The off-white to basally brown stem has a ring toward the top and is fibrous below. The narrow gills are adnate to slightly decurrent and are medium spaced. *Galerina* species need careful identification; there are seven others that can cause severe poisoning.

• **OCCURRENCE** On dead and rotten stumps and trunks, often on moss and leaf litter in damp, boggy deciduous woodland. Widespread in northern temperate zones.

• **SIMILAR SPECIES** *Armillaria mellea*, the Honey Mushroom (p.80), is typically larger with a white spore print.

FRUITING Mostly appears in dense swarms.

Dimensions CAP ⟷ 1–5cm | STEM ↕ 3–7cm ↔ 3–7mm	Spores Rust-brown	Edibility ☠

Family STROPHARIACEAE	Species *Pholiota alnicola*	Season Autumn

ALDER PHOLIOTA

A yellow cap – or yellow with some green intermixed – and a clump-forming habit are two distinguishing features of this species. A scaly cap is typical of the genus, but in this and some other members, the scales are not very conspicuous and are usually seen more clearly in young specimens as veil scales at the cap margin. The wavy stem is almost smooth, more fibrous at the base. The pale flesh has a pleasant smell and a mild taste.

• **OCCURRENCE** On dead or dying deciduous trees, such as alder and birch, rarely on conifers; often in damp sites. Widespread in northern temperate zones; exact distribution unknown.

• **SIMILAR SPECIES** Three forms of *Pholiota alnicola* are sometimes classified separately: *P. salicicola* grows on willow and tastes bitter; *P. flavida* and *P. pinicola* grow on conifers.

FRUITING Appears in clusters of fruitbodies.

Dimensions CAP ⟷ 3–7cm | STEM ↕ 8–15cm ↔ 0.6–1cm	Spores Brown	Edibility 🚫

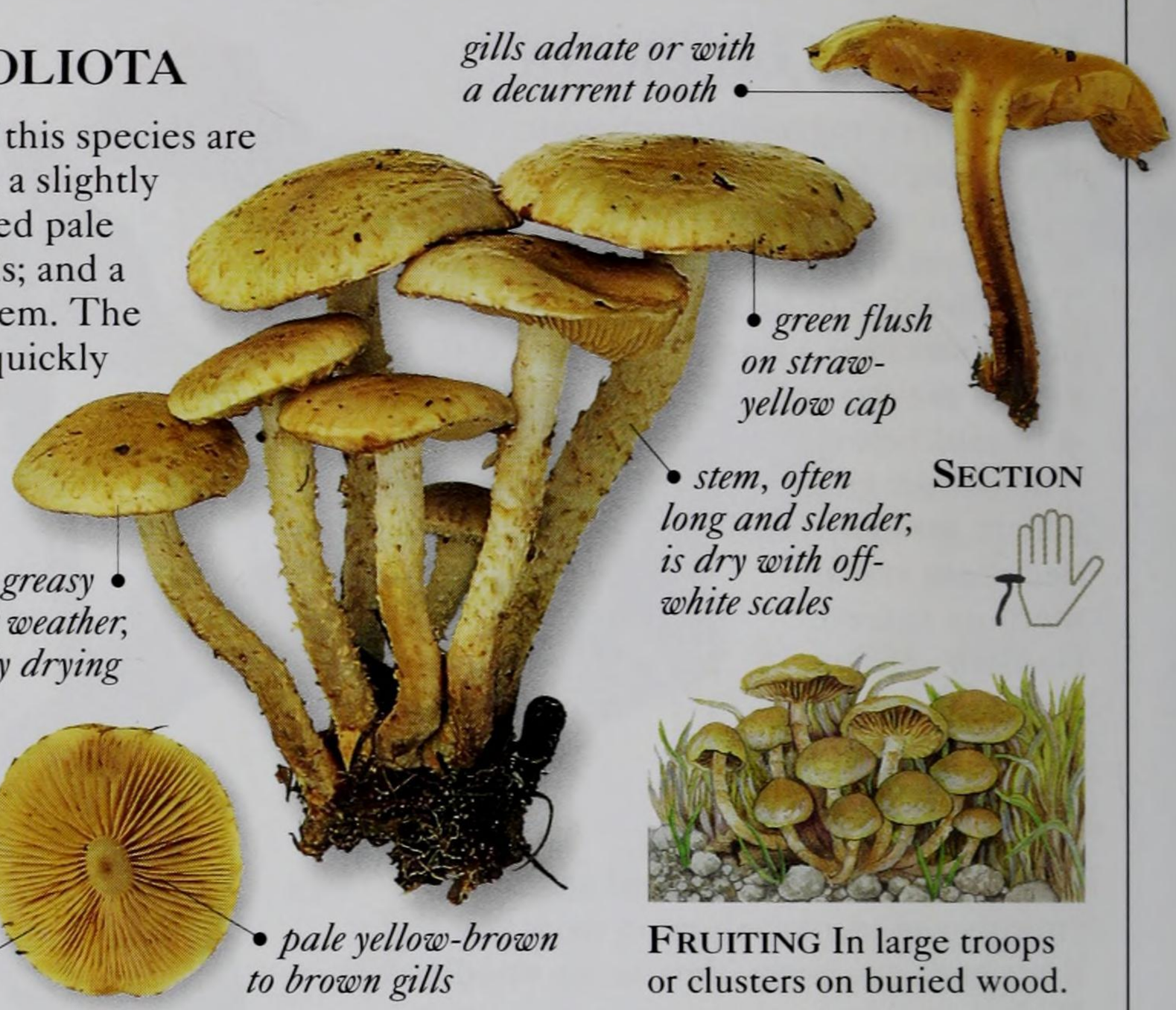
Family STROPHARIACEAE	Species *Pholiota gummosa*	Season Autumn–late autumn

OCHER-GREEN PHOLIOTA

The key identification points of this species are a convex then flattened cap with a slightly scaly, straw-yellow surface, flushed pale ocher-green; yellow to brown gills; and a dirty yellow to off-white, scaly stem. The cap is slimy only when wet and quickly dries out. The white to yellow flesh becomes rusty brown at the stem base. It has no distinct smell or taste.

• **OCCURRENCE** Often along roads, mostly from wood underground. Not reported in North America.

• **SIMILAR SPECIES** *Pholiota scamba* is smaller and grows on conifers.



SECTION

FRUITING In large troops or clusters on buried wood.

Dimensions CAP ⟷ 2–6cm | STEM ↕ 4–9cm ↔ 0.4–1cm	Spores Brown	Edibility

Family STROPHARIACEAE	Species *Pholiota lenta*	Season Late autumn

SLIMY GROUND PHOLIOTA

Pale yellow to brown gills and a greasy cap that is slimy in wet weather, with scattered white veil scales, are good indicators of this mushroom. The cap is convex, off-white, pale yellow, or pale gray, and normally has a totally smooth surface. The inedible flesh is pale with a smell of straw and a mild taste.

• **OCCURRENCE** Mostly on underground woody substrates; typically in beech woods but also with other deciduous trees and occasionally under conifers. Widespread in northern temperate zones.

SECTION

FRUITING Singly or in small groups among leaf litter.

Dimensions CAP ⟷ 4–8cm | STEM ↕ 5–8cm ↔ 0.7–1.2cm	Spores Brown	Edibility

Family STROPHARIACEAE	Species *Pholiota highlandensis*	Season Almost all year

CHARCOAL PHOLIOTA

Apart from its distinctive habitat – on bonfire sites – this mushroom is notable for having a fairly fleshy, orange-brown fruitbody with a convex to somewhat wavy, slimy cap. It has a dry stem, which is fibrous toward the base, and the inedible flesh is pale yellow to rusty brown with a mild taste; the smell is not distinctive.

• **OCCURRENCE** On bonfire sites or in woods and tree stands where a fire has occurred. Widespread in northern temperate zones.

• **SIMILAR SPECIES** Other gilled mushrooms found on charred sites, including *Mycena galopus* (p.137) and *Tephrocybe anthracophilum*, are usually smaller; *Myxomphalia maura* is a darker shade.

FRUITING Appears in swarms or small clusters.

Dimensions CAP ⊕ 2–6cm | STEM ↕ 2–6cm ↔ 0.4–1cm	Spores Brown	Edibility

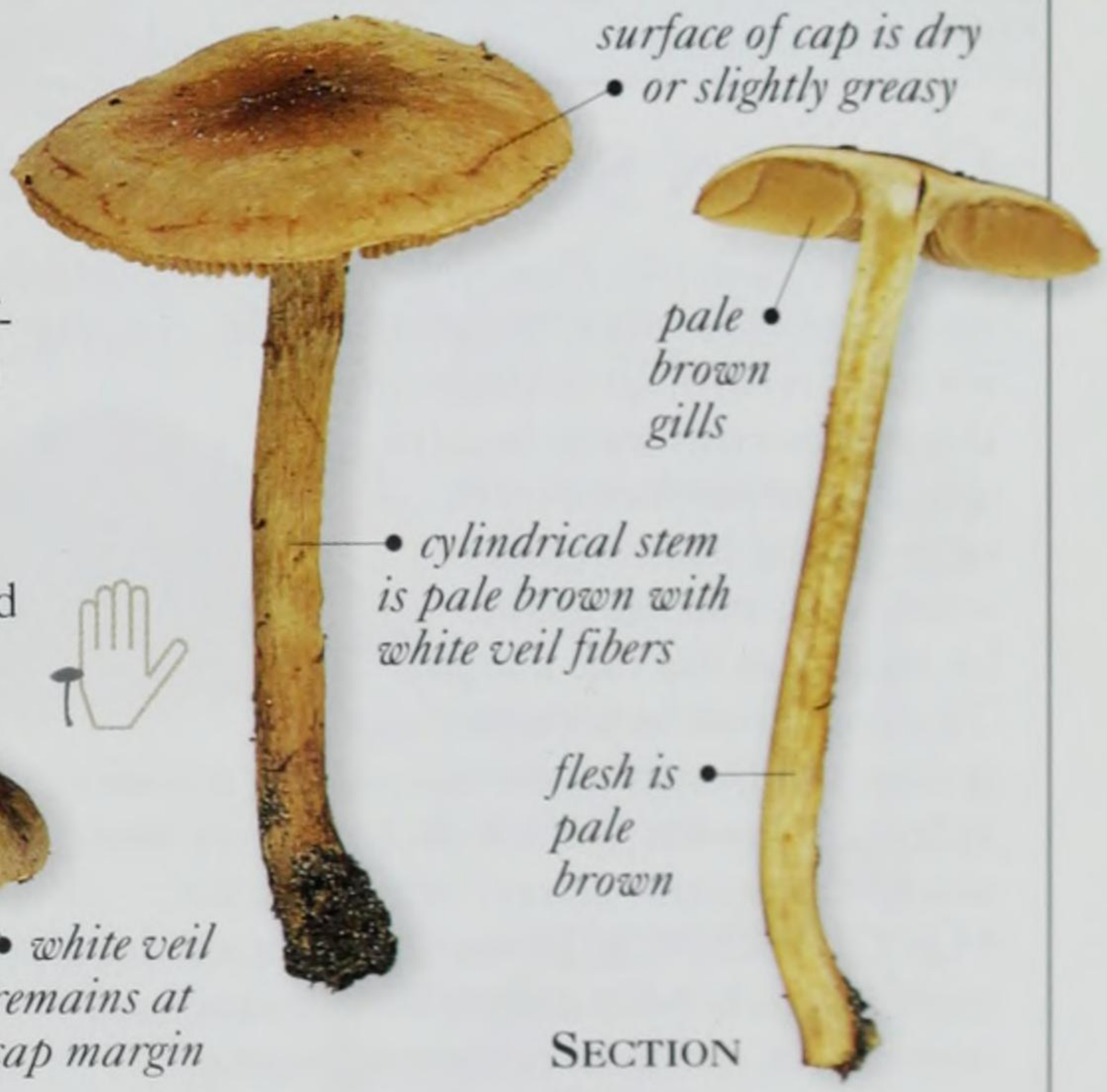
Family CORTINARIACEAE	Species *Hebeloma mesophaeum*	Season Autumn–late autumn

VEILED HEBELOMA

This species has a convex to broadly umbonate, gray-brown cap, with a paler margin and a pale brown stem. Belonging to a group of *Hebeloma* species that have veils, its veil is visible as fine, off-white threads and patches near the cap margin and on the upper stem. The flesh is pale brown, and, like most *Hebeloma* species, it smells of radishes.

• **OCCURRENCE** Mycorrhizal with trees in mixed woods, parks, and gardens; sometimes found on burned ground. Widespread and very common in northern temperate zones.

• **SIMILAR SPECIES** Relatives such as *H. candidipes* are distinguished by microscopic examination.



FRUITING Appears in troops under trees.

Dimensions CAP ⊕ 2–5cm | STEM ↕ 2–6cm ↔ 3–7mm	Spores Tobacco-brown	Edibility

Family CORTINARIACEAE	Species *Gymnopilus penetrans*	Season Autumn

FRECKLE-GILLED GYM

This is a fairly uniformly orange-brown species with a convex to flattened or umbonate cap and a paler stem with an indistinct veil zone. The pale yellow gills have rusty flecks. It is sometimes divided into two more species: *Gymnopilus hybridus* and *G. sapineus*. All *Gymnopilus* species occur on dead wood or plant remains, unlike related *Cortinarius* species (pp.69–77), which are mycorrhizal.

• **OCCURRENCE** On dead wood, mostly conifers, in woods and tree stands. Widespread in northern temperate zones.

• **SIMILAR SPECIES**

G. picreus has a dark stem and vivid yellow gills.

FRUITING Appears mostly in small groups or singly.

Dimensions CAP ⟷ 3–8cm | STEM ↕ 4–7cm ↔ 0.4–1cm	Spores Rust-brown	Edibility

Family COPRINACEAE	Species *Psathyrella piluliformis*	Season Autumn

COMMON STUMP PSATHYRELLA

In the large genus *Psathyrella*, consisting mainly of little brown mushrooms – so-called LBMs – among which it is difficult to distinguish, this species has some helpful characteristics: it occurs in clusters and has a distinct white veil, stained brown by spores, at the cap margin. The convex to bell-shaped cap is dark red-brown when wet, drying to paler yellowish brown. Details such as spore size ultimately ensure correct identification.

• **OCCURRENCE** In woods on rotten deciduous stumps; rarely on conifers. Widespread and common in northern temperate zones.

FRUITING In dense clusters on and near deciduous stumps.

Dimensions CAP ⟷ 1.5–6cm | STEM ↕ 3–10cm ↔ 3–9mm	Spores Dark purplish brown	Edibility

Family COPRINACEAE	Species *Psathyrella candolleana*	Season Late spring–autumn

COMMON PARK PSATHYRELLA

An early fruiting species, and perhaps one of the most common in this difficult genus of mostly little brown mushrooms, *Psathyrella candolleana* has a convex to umbonate, yellow-brown cap, which rapidly dries to ivory-white, and a threadlike veil that disappears with age, leaving an almost smooth surface. The fruitbody is extremely brittle when dry. As the spores mature, the gills change color from white through lilac to brown.

• **OCCURRENCE** In gardens, parks, and woods; it is found close to rotten deciduous trees. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** The much darker *P. spadiceogrisea* occurs along forest paths and in similar sites in late spring and early summer.

FRUITING In troops on and around rotten wood.

Dimensions CAP ⊕ 1.5–7cm | STEM ↕ 3–9cm ↔ 2–6mm	Spores Brownish purple	Edibility

Family COPRINACEAE	Species *Panaeolus semiovatus*	Season Late spring–autumn

COMMON RINGED PANAEOLUS

A distinguishing feature of this species is its cap, which is sticky when wet and shiny, often with wrinkles, when dry. White to ivory or beige, it is egg- to bell-shaped with a margin that is smooth or has white veil remnants. The stem has a white ring that is typically stained black from falling spores. The white to pale straw-yellow flesh may contain a hallucinogen.

• **OCCURRENCE** In pastures on dung or straw mixed with dung. Widespread in northern temperate zones.

• **SIMILAR SPECIES** *P. antillarum* lacks a stem ring.

FRUITING Singly or a few on each dropping of dung.

Dimensions CAP ⊕ 1–6cm | STEM ↕ 6–10cm ↔ 3–5mm	Spores Black	Edibility

Family BOLBITIACEAE	Species *Conocybe arrhenii*	Season Late summer–late autumn

DEADLY CONOCYBE COMPLEX

This is one of the most common members of a subgroup of *Conocybe* species often called *Pholiotina*. Members are so similar that they are best distinguished by their spores. They have scaly veil remnants at the cap margin or a stem ring. The ring tends to be loose and is easily lost. The gills are fairly crowded and adnexed, often with a white margin. All members are suspected to be poisonous.

• **OCCURRENCE** Typically on nutrient-rich soil in disturbed sites. Often occurs alongside other *Conocybe* species and with species of *Lepiota* and *Psathyrella*. Widespread in Asia and Europe; world distribution not clear.

• **SIMILAR SPECIES** *C. blattaria* and *C. percincta* have 2-spored basidia; those of *C. arrhenii* are 4-spored.

FRUITING Often singly or just a few fruitbodies, along roads and beside paths.

Dimensions CAP ⊕ 1–3cm | STEM ↕ 1.5–5cm ↔ 1.5–3mm	Spores Rusty brown	Edibility ☠

Family TRICHOLOMATACEAE	Species *Cystoderma terrei*	Season Autumn

CINNABAR CYSTODERMA

A convex to umbonate, brick-red cap with a mealy surface and a club-shaped stem with red scales on the lower part are the main features of this species. It has fairly crowded, adnexed, pale gills. When examined with a hand lens, the gills can be seen to be fimbriate. A microscope reveals cystidia (special sterile cells) on the edges of the gills.

• **OCCURRENCE** Woodland areas and in planted areas on humus-rich, acidic soil. The world distribution of this species is not fully understood, but it is widespread in Europe, Japan, and North America.

• **SIMILAR SPECIES** There are several similar *Cystoderma* species found in similar habitats. *C. granulosum* has more dirty, rusty brown coloring. Close relative *C. adnatifolium* lacks cystidia and is brighter in color.

FRUITING Appears singly or a few together.

Dimensions CAP ⊕ 2–8cm | STEM ↕ 3–7cm ↔ 4–8mm	Spores Off-white	Edibility 🍽

Family TRICHOLOMATACEAE	Species *Cystoderma amianthinum*	Season Autumn

SAFFRON CYSTODERMA

This bright ocher-yellow species has a bell-shaped to flat cap with a mealy surface and a fringed margin. Below the short-lived ring, the stem surface is mealy or granular. The crowded, adnexed gills are white, becoming creamy yellow with age; the pale yellow flesh is thin and has a musty, pungent odor. The identity of *Cystoderma* species is best confirmed by microscopic comparison of spore size: those of *C. amianthinum* are generally 6 x 3µm.

• **OCCURRENCE** In varied sites – in moss in woodland, with willow, or with grasses or bracken. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *Cystoderma amianthinum* var. *rugoso-reticulatum* has a deeply wrinkled cap and pungent odor. *Cystoderma jasonis* is darker with a coarser cap surface; its spores are larger (7 x 4µm).

FRUITING Appears singly or a few fruitbodies together among mosses in damp, acidic woodland.

Dimensions CAP ⟷ 1–4cm | STEM ↕ 2.5–6cm ↔ 3–7mm	Spores Off-white	Edibility

Family TRICHOLOMATACEAE	Species *Cystoderma carcharias*	Season Autumn–late autumn

PINK-GRAY CYSTODERMA

Besides the pinkish gray color of both cap and stem, this species is characterized by a prominent, cufflike, pink-gray stem ring. The surfaces of the cap and stem are powdery, as in other members of the genus *Cystoderma*. The adnexed gills are white and medium spaced. The white flesh has an unpleasant, rancid smell.

• **OCCURRENCE** In woods and on wasteland. Widespread in parts of northern temperate zones but not as common as *C. amianthinum* (above).

• **SIMILAR SPECIES** *C. ambrosii* has fruitbodies that are almost pure white and become slightly brown with age. The fruitbodies of *C. fallax* are yellow-brown. *Lepiota* species have free gills.

FRUITING Typically in small groups or singly, always on acidic soil and humus among leaf litter and moss.

Dimensions CAP ⟷ 2–5cm | STEM ↕ 4–8cm ↔ 2–7mm	Spores Off-white	Edibility

WITH FIBROUS CAP AND DARK SPORES

THIS SUBSECTION comprises agarics that, in addition to having adnate to adnexed gills (see p.56), have a cap with a distinctly fibrous or scaly surface. The spore deposits of all the species featured here are in various shades of brown, although not rust-colored (see pp.69–77 for species with rusty brown spores). The species that belong in this subsection are members of the genera *Inocybe* and *Lacrymaria*. Some have veils; others do not. Those *Inocybe* species that lack veils have very fine hairs covering the entire stems. A hand lens is needed in order to see these hairs, which are called cystidia.

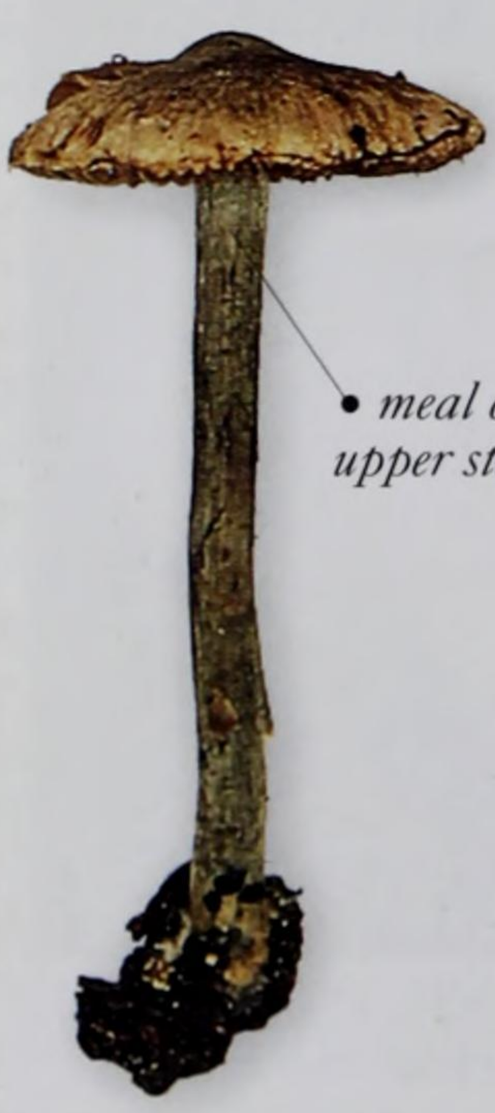
Family CORTINARIACEAE	Species *Inocybe haemacta*	Season Autumn

GREEN AND PINK INOCYBE

The fruitbodies of this species have green tones, rare in this usually dull-colored genus. The convex to umbonate, gray- to greenish brown cap has a fibrous or scaly center. Both the cap and the pale gray flesh become redder with age. The greenish gray stem is fibrous toward the base and has a mealy covering at the top, which is paler in color. The Green and Pink Inocybe smells similar to urine or a stable.

• **OCCURRENCE** Mycorrhizal with deciduous trees on rich soil, in parks and woods or on roadsides. Widespread but local to rare in Europe; not reported in North America.

• **SIMILAR SPECIES** *Inocybe corydalina*, which has a ciderlike smell, may have green hues on the cap.



FRUITING Appears singly or a few together.

Dimensions CAP ⟷ 3–6.5cm | STEM ↕ 2–8cm ↔ 4–6mm	Spores Tobacco-brown	Edibility ☠

Family CORTINARIACEAE	Species *Inocybe erubescens*	Season Spring–autumn

DEADLY INOCYBE

The early appearance of this fleshy species, which is known to be involved in poisonings (see SIMILAR SPECIES), is a noteworthy characteristic, as is the fact that the fruitbody stains red when older or if handled. It has a bell-shaped to broadly conical or umbonate cap, the surface of which has distinct radial fibers, common to the genus. The squat stem, which is rarely longer than the diameter of the cap, is sturdy, and its surface has a mealy covering.

• **OCCURRENCE** Mycorrhizal with trees such as beech and linden, on clay or calcareous soil. Widespread but local in Europe and parts of Asia.

• **SIMILAR SPECIES** It has been mistaken for edible fungi, such as *Calocybe gambosa* (p.58). *Inocybe pudica* stains red, but has more slender, whiter fruitbodies.

SECTION

FRUITING In troops on fruitbodies on rich soil.

Dimensions CAP ⟷ 3–9cm | STEM ↕ 4–7cm ↔ 1–2cm	Spores Snuff-brown	Edibility

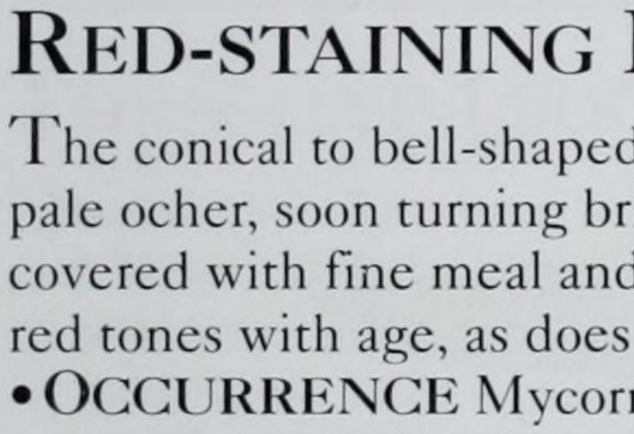
Family CORTINARIACEAE	Species *Inocybe godeyi*	Season Autumn

RED-STAINING INOCYBE

The conical to bell-shaped cap of this species is creamy white to pale ocher, soon turning bright orange-red. The off-white stem is covered with fine meal and has a bulbous base; it also develops red tones with age, as does the faintly scented flesh.

• **OCCURRENCE** Mycorrhizal with deciduous trees, especially beech, on alkaline soil. Widespread but rather local in Europe; reported in eastern North America.

• **SIMILAR SPECIES** *I. pudica*, found in Pacific Northwest, is also white, aging pale pink, but lacks the stem bulb.



FRUITING Typically a few together on soil beside paths.

SECTION

Dimensions CAP ⟷ 1.5–5cm | STEM ↕ 2–7cm ↔ 3–6mm	Spores Tobacco-brown	Edibility

Family CORTINARIACEAE	Species *Inocybe geophylla*	Season Autumn

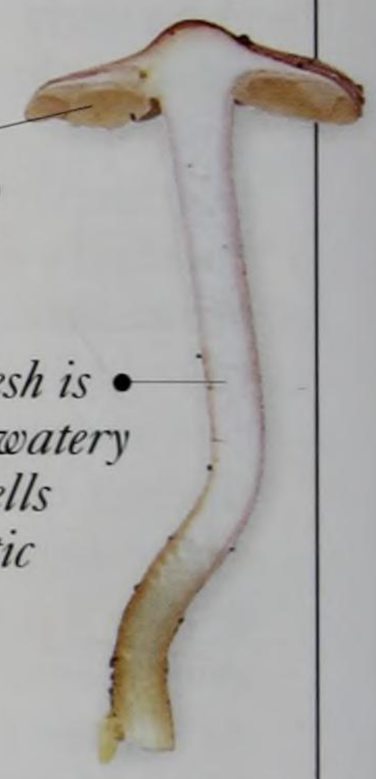
WHITE OR LILAC INOCYBE

This species, which smells strongly spermatic, has a conical to umbonate, silky, streaked cap. The upper stem has a mealy covering; the lower stem is more fibrous. There is no stem bulb. It occurs in two main color forms: white, sometimes with ocher tinges, and lilac with brown gills. This is one of the most common *Inocybe* species.

• **OCCURRENCE** Mycorrhizal with conifers and deciduous trees, among pine needles or on rich soil, often bare and disturbed, such as along ditches or beside roads. It is widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *I. sindonia* is also white, but it is more robust. It is found only under conifers. Other pale species tend to be bigger or have more fibrillose or scaly caps.

LILAC FORM



WHITE FORM

FRUITING A few together or in troops near trees.

Dimensions CAP ⟷ 1–4cm | STEM ↕ 2–5cm ↔ 3–5mm	Spores Brown	Edibility ☠

Family CORTINARIACEAE	Species *Inocybe rimosa*	Season Summer–autumn

STRAW-COLORED INOCYBE

This common, variable mushroom has a distinctive, pointed cap with coarse, radiating fibers and, with age, an upturned margin that tears very easily. The fruitbody is more or less yellow in color. The upper stem is finely downy; the base is wider but not bulbous. Typically, the gills will have a yellowish flush.

• **OCCURRENCE** Mycorrhizal, mostly with deciduous trees on more fertile, often disturbed soil along bridle paths. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** The equally common *Inocybe maculata* has a darker reddish brown cap with patches of off-white veil. Its pale stem may have a small basal bulb. The hundreds of other *Inocybe* species are accurately identified only by using very specialized literature.

SECTION

FRUITING Appears mostly in small groups on soil.

Dimensions CAP ⟷ 3–7cm | STEM ↕ 6–10cm ↔ 0.5–1cm	Spores Tobacco-brown	Edibility ☠

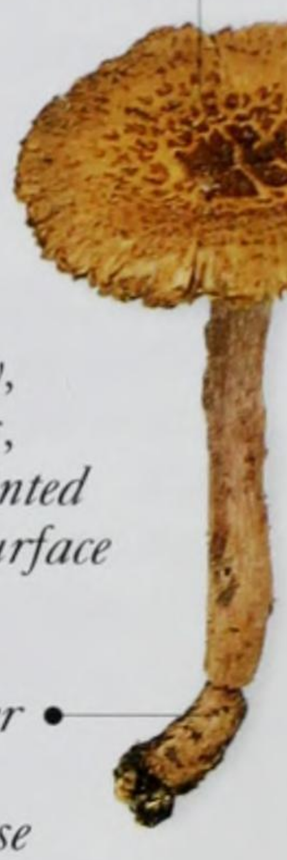
Family CORTINARIACEAE	Species *Inocybe griseolilacina*	Season Autumn

GRAY AND LILAC INOCYBE

Small brown scales cover the convex, ocher-brown cap of this species. The scaly, fibrous stem is pale lilac, and a lilac flush may be visible on the cap. There is no basal stem bulb.

• OCCURRENCE
Mycorrhizal with deciduous trees on more fertile soil; often found along road edges, like other close relatives. Widespread in northern temperate zones, but exact distribution is not known.

• SIMILAR SPECIES
Inocybe cincinnata has a darker cap, and the lilac stem color is stronger near the top. *I. pusio* also has lilac stem coloring but is less scaly on the cap.



SECTION

FRUITING Appears in troops or small groups.

Dimensions CAP ⟷ 0.8–4cm | STEM ↕ 4–7cm ↔ 2–6mm	Spores Brown	Edibility

Family CORTINARIACEAE	Species *Inocybe lacera*	Season Spring–autumn

TORN-CAP INOCYBE

Fine fibers and scales cover the convex cap of this dull brown to dark brown species. Young specimens display a veil at the cap margin. The brown fibrous stem does not have a basal bulb. The flesh is typically pale in the cap and becomes darker toward the stem base. A microscope will reveal smooth, cylindrical spores and thick-walled cystidia of this variable species.

• OCCURRENCE Mycorrhizal with various trees, including willow and conifers; found on hard-packed forest trails. Widespread and common in northern temperate zones.

• SIMILAR SPECIES *Inocybe lanuginosa* has a more woolly stem and spores with nodules.

FRUITING A few together or in troops, often on poor soil.

SECTION

Dimensions CAP ⟷ 1–4.5cm | STEM ↕ 2.5–6cm ↔ 2–6mm	Spores Tobacco-brown	Edibility

Family CORTINARIACEAE	Species *Inocybe asterospora*	Season Autumn

STAR-SPORED INOCYBE

A distinctive, flattened bulb at the base of a slender, downy stem and a slightly umbonate, pale cap thickly covered with radiating, coarse, dark red-brown fibers characterize this species. Microscopic examination reveals star-shaped spores: the spores of *Inocybe* species are usually either smooth or have nodules (a star shape is an extreme form of the latter type).

• **OCCURRENCE** Mycorrhizal with deciduous trees, especially hazel or beech; often on bare soil. Widespread in northern temperate zones, locally common in eastern North America.

• **SIMILAR SPECIES** *I. margaritispora* has star-shaped spores but a paler, yellower cap. *I. napipes* has a less marked bulb, is smaller, and has ordinary noduled spores.

FRUITING Appears singly or a few fruitbodies together.

Dimensions CAP ⟷ 3–7cm | STEM ↕ 4–9cm ↔ 0.5–1.2cm	Spores Tobacco-brown	Edibility ☠

Family COPRINACEAE	Species *Psathyrella velutina*	Season Autumn

WEEPING GILLED PSATHYRELLA

The convex or umbonate cap of this species is brownish gray to ocher with a felted surface. The similarly colored stem is fibrillose and fragile. Gray becoming black, the gills are well spaced and adnate. Milky drops can be seen along the gill edges when they are young – hence the common name; these droplets fill with spores and dry as black spots.

• **OCCURRENCE** Saprotrophic; on nutrient-rich, disturbed soil. Widespread in northern temperate zones.

• **SIMILAR SPECIES** There are several similar species, including *Psathyrella glareosa* and *P. pyrotricha*. These are distinguished by their size and cap color and by spore characteristics.

FRUITING Appears in large troops of fruitbodies along roads and paths, often near nettles.

Dimensions CAP ⟷ 2–10cm | STEM ↕ 4–12cm ↔ 0.5–2cm	Spores Blackish	Edibility 🍽

MEDIUM-SIZED WITH SMOOTH CAP

IN THIS SUBSECTION, species with adnate, adnexed, or notched gills (see pp.15 and 56) have been grouped together according to their size and cap characteristics. Medium-sized refers to the fruitbodies that have caps typically in the range of 1.5 to 6cm in diameter. The smooth surface of the caps is one of the most readily visible characteristics. The color of the spore deposits of species featured here varies widely from white, which is common to *Hygrocybe* species, through cream (found in species of *Collybia)* to pink (produced by *Entoloma* species) and black (which occurs in many *Psathyrella* species).

Family HYGROPHORACEAE	Species *Hygrocybe calyptraeformis*	Season Throughout autumn

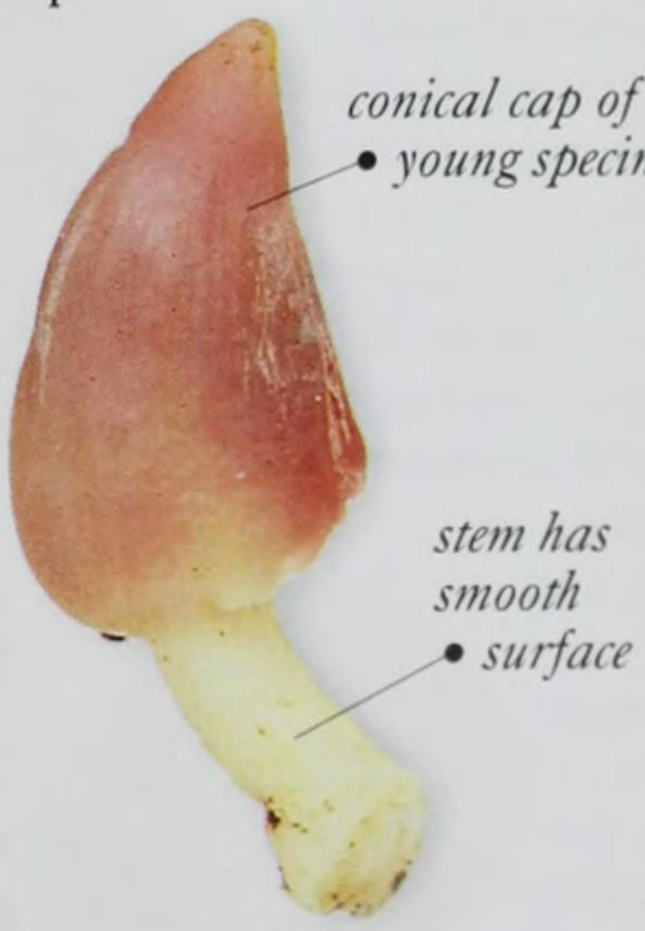
PINK WAX CAP

The elegant and fragile, dusky pink fruitbodies of this rare species are quite unmistakable. Each has a cap that begins conical and opens out fully as it matures, eventually splitting radially. The stem is very brittle and is difficult to pull out of the substrate. It has mild-tasting, pale pink to white flesh. It is not recommended for eating because of concern about its conservation, and its edibility has not been very well documented.

• **OCCURRENCE** Long-established areas of grassland where commercial fertilizers have not been applied, often on alkaline soil. Widespread throughout Europe, including the islands of the North Atlantic.

• **SIMILAR SPECIES** *Hygrocybe citrinovirens* is similar in shape but is yellow-green and orange; it is also rare. Other *Hygrocybe* species have conical caps, but *H. calyptraeformis* and *H. citrinovirens* are the only ones that split so widely. *H. conica* (p.104) blackens with age. *H. spadicea* has a dark cap and yellow gills. It does not blacken.

SECTION



FRUITING In small groups among grasses and mosses.

Dimensions CAP ⟷ 3–7cm | STEM ↕ 5–10cm ↔ 0.5–1cm	Spores White	Edibility

Family HYGROPHORACEAE	Species *Hygrocybe conica*	Season Summer–late autumn

BLACKENING WAX CAP

The slightly conical cap of this variable fungus is dry and fibrillose; the stem is yellow to red with longitudinal lines. This species occurs in a wide variety of colors, sizes, and shapes, and, among *Hygrocybe* species, it probably has the broadest range of habitats (leading some mycologists to suggest it is a range of species and varieties). It blackens with age or when handled. It may be slightly poisonous.

• **OCCURRENCE** In grassy areas, and open woods. Widespread in northern temperate zones.

• **SIMILAR SPECIES** *H. acutoconica* does not stain black nor does *Entoloma salmoneum*, which has a pink spore print and angular spores.

FRUITING Appears mostly in small groups of fruitbodies.

Dimensions CAP ⇔ 1–5cm | STEM ↕ 2–10cm ↔ 0.4–1.5cm	Spores White	Edibility

Family HYGROPHORACEAE	Species *Hygrocybe chlorophana*	Season Autumn–late autumn

GOLDEN WAX CAP

This fairly large *Hygrocybe* species, ranging from rich orange-yellow to shades of pale yellow, has a slimy, convex to flattened cap, aging grayish yellow and with a more or less striate margin. The stem can be slimy but tends to have a powdery top. Edible, but not recommended, it has mild, pale yellow flesh.

• **OCCURRENCE** In various unimproved grassy areas, mostly with other *Hygrocybe* species. Widespread and common in eastern North America, Texas, and Pacific Northwest.

• **SIMILAR SPECIES** *H. ceracea* is smaller and less slimy on the cap, with adnate or decurrent gills. *H. flavescens* has a similarly colored slimy cap but has a white stem base. *H. glutinipes*.

FRUITING Appears in troops and fairy rings.

Dimensions CAP ⇔ 1.5–7cm | STEM ↕ 2.5–10cm ↔ 3–8mm	Spores White	Edibility

Family HYGROPHORACEAE	Species *Hygrocybe coccinea*	Season Late summer–late autumn

SCARLET WAX CAP

A slightly grainy surface on the bell-shaped cap, which is dry but becomes sticky in wet weather, and adnate gills help to distinguish this mushroom from other red *Hygrocybe* species. It is edible, but not choice, with a faint smell and taste. Small and more orange forms of *H. coccinea* can be difficult to distinguish and need to be studied with a microscope and identified using very specialized literature.

• **OCCURRENCE** In unimproved grassy areas. Widespread and fairly common in eastern North America and California.

• **SIMILAR SPECIES** *H. punicea* (p.56) and *H. splendidissima* are fleshier and have adnexed gills. The latter has an almost smooth stem and smells of honey.

FRUITING Appears in troops or small groups.

Dimensions CAP ⟷ 1.5–6cm | STEM ↕ 4–8cm ↔ 0.4–1cm	Spores White	Edibility

Family HYGROPHORACEAE	Species *Hygrocybe psittacina*	Season Summer–late autumn

PARROT WAX CAP

This spectacular species may be difficult to identify because of the vast range of colors exhibited by specimens of different ages. When young, the convex or bell-shaped cap is deep bottle-green; with age, purple, orange, and yellow develop. The stem is yellow, tinged blue-green. The fruitbody has a slimy surface when young and is almost odorless. It is inedible.

• **OCCURRENCE** In meadows, roadsides, and woods on rich soil, with species of *Geoglossum* (p.242) and *Clavulinopsis* (p.240), and other members of the Clavariaceae. Widespread and common in northern temperate zones; common in eastern North America.

• **SIMILAR SPECIES** *Hygrocybe psittacina* var. *perplexa* lacks green color and is somewhat brick-red.

FRUITING In small groups, mostly in meadows.

Dimensions CAP ⟷ 1–4cm | STEM ↕ 3–7cm ↔ 4–8mm	Spores White	Edibility

Family HYGROPHORACEAE	Species *Hygrophorus eburneus*	Season Autumn–early winter

SATIN WAX CAP

The convex to flattened, sparkling white cap of this species drips with slime in wet weather. The stem is also slimy and white. Both stain slightly yellow with age. The gills are thick and waxy, and the white flesh smells pleasantly aromatic but is not worth eating.

• **OCCURRENCE** Mycorrhizal with beech trees on fertile soil. Widespread in northern temperate regions where beech grows; found in eastern North America and California.

• **SIMILAR SPECIES** *Hygrophorus discoxanthus* stains deep orange.

FRUITING In small clusters among leaf litter on soil.

Dimensions CAP ⊕ 3–8cm | STEM ↕ 4–10cm ↔ 0.5–1cm	Spores White	Edibility

Family BOLBITIACEAE	Species *Agrocybe pediades*	Season Summer–autumn

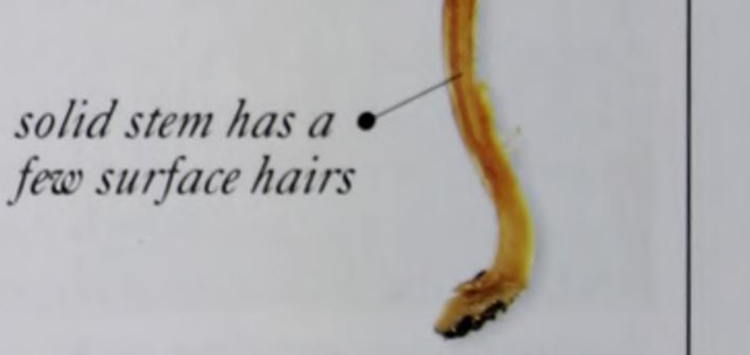
COMMON LAWN AGROCYBE

Normally completely smooth with a gently convex, yellowish ocher cap and no veil, this species is not particularly distinctive. The stem is solid, cylindrical, and straight, and the flesh is pale with a yeasty smell and taste. Some experts divide *Agrocybe pediades* into several species, mainly by habitat and microscopic features, such as spore size.

• **OCCURRENCE** Typically in lawns and other types of grassland but can also grow on mulch containing horse manure. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *A. arvalis* has a downy stem that springs from a black sclerotium. Related *A. dura* is paler and fleshier, with a veil at the cap margin.

FRUITING Appears singly or in troops of fruitbodies.



Dimensions CAP ⊕ 1–3.5cm | STEM ↕ 2.5–5cm ↔ 3–5mm	Spores Tobacco-brown	Edibility

Family COPRINACEAE	Species *Panaeolus papilionaceus*	Season Summer–late autumn

FRINGED PANAEOLUS

Triangular veil remnants at the cap margin are characteristic of this species. The cap is convex or bell-shaped and varies from dark gray to brownish gray; older specimens may have pale caps contrasting with the dark brown stems. Marbled gills caused by uneven ripening of the spores are typical of *Panaeolus* species. The flesh is dark brown in the stem, paler in the cap, and has no distinct smell. A form with a strongly veined cap was previously regarded as a separate species, *P. retirugis*. Because of conflicting reports on toxicity, this species should not be eaten.

• **OCCURRENCE** On old dung or in manured, grazed fields. Widespread in northern temperate zones and elsewhere.

FRUITING Singly or a few together on or near manure.

Dimensions CAP ⇔ 1–4cm | STEM ↕ 4–10cm ↔ 2–3mm	Spores Black	Edibility ☠

Family STROPHARIACEAE	Species *Psilocybe cyanescens*	Season Autumn–early winter

COMMON WOOD-CHIP PSILOCYBE

This hallucinogenic agaric has a flattened cap with a wavy margin; reddish buff at first, it dries to creamy ocher and develops dark blue discoloration when handled. It becomes greasy in wet weather. The off-white to gray stem, which also stains blue, has no ring. Several stems are frequently joined at the base. The white flesh has a faint yeasty smell.

• **OCCURRENCE** Mostly in disturbed sites, such as a flower bed mulch that contains coniferous wood chips. Widespread but rather local, in northern temperate zones.

• **SIMILAR SPECIES** The many blue-staining *Psilocybe*s in North America can be reliably identified to species only with technical literature.

FRUITING In troops or clusters in disturbed sites.

Dimensions CAP ⇔ 2–4cm | STEM ↕ 3–6cm ↔ 3–8mm	Spores Dark purplish brown	Edibility ☠

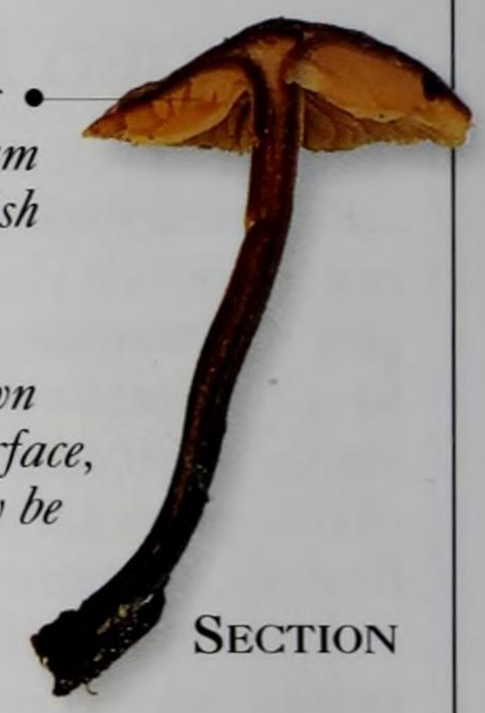
Family TRICHOLOMATACEAE	Species *Macrocystidia cucumis*	Season Late summer–autumn

CUCUMBER-SCENTED MUSHROOM

This agaric has a strong, rancid smell of rotten cucumbers or pickled herrings. The dark brown or orange-brown cap has a pale yellow margin and velvety surface. The fairly tough stem is also densely velvety; it is dark at the base and paler near the top. The spore print is sometimes off-white to pale pink, indicating a complex of species.

• **OCCURRENCE** In gardens, parks, or along roads, on rich soil mixed with leaf litter or sawdust. Widespread but local in northern temperate zones; widespread in Europe but more local in the Pacific Northwest.

FRUITING A few fruitbodies together or in troops.



Dimensions CAP ⇔ 0.5–5cm | STEM ↕ 3–7cm ↔ 2–5mm	Spores Rusty ocher or off-white	Edibility

Family COPRINACEAE	Species *Psathyrella multipedata*	Season Autumn

TUFTED PSATHYRELLA

The bell-shaped to conical, gray- or red-brown cap of this cluster-forming species has striations halfway to the center. It dries to pale yellow-brown and has no obvious veil. Clusters of up to 80 smooth white stems are joined at the base and extend, rootlike, deep into the soil. This is among the very few *Psathyrella* species with clear identification features, distinguishing it from most other little brown mushrooms (LBMs).

• **OCCURRENCE** On rich, loamy, or clay soil, often in urban areas such as city parks and on roadsides. Widespread in Europe; reported in the Midwest.

• **SIMILAR SPECIES** *P. piluliformis* (p.94). Other tufted agarics in open areas include *Lyophyllum decastes* (p.41) and other species of *Lyophyllum* (p.132), which all have white spore deposits.

FRUITING Always in tight clusters, rooted deeply in turf.

Dimensions CAP ⇔ 0.8–4cm | STEM ↕ 8–14cm ↔ 2–4mm	Spores Brownish black	Edibility

Family COPRINACEAE	Species *Psathyrella conopilus*	Season Late summer–late autumn

DARK CONE PSATHYRELLA

Known for its elegant stature and dark reddish brown cap, which dries to pale ocher-yellow, this is a distinctive, if fragile, *Psathyrella* species. The conical cap is smooth with marginal striations. When examined with a hand lens, thick-walled dark hairs are visible on the cap surface and in the thin flesh – a unique feature in the genus.

• **OCCURRENCE** Along roadsides, bridle paths, and in parks on disturbed soil, especially among wood chips and debris. Widespread and common in Europe and North America.

• **SIMILAR SPECIES** A number of similar species are smaller, paler, and often have pink tinges. In sand dunes, one of the most common gilled mushrooms is *P. ammophila*, which grows on marram grass.

FRUITING In scattered fruitbodies or in troops.

• orange-brown cap dries to pale ocher-yellow

Dimensions CAP ⇔ 2–6cm | STEM ↕ 9–19cm ↔ 2–3mm	Spores Black	Edibility

Family ENTOLOMATACEAE	Species *Entoloma cetratum*	Season Early summer–late autumn

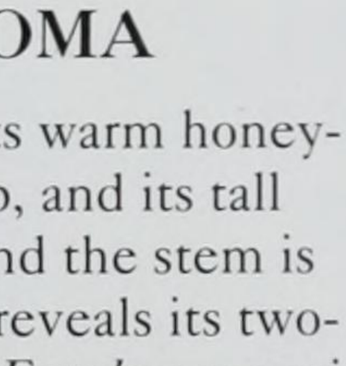
HONEY-COLORED ENTOLOMA

This is an elegant species, identifiable by its warm honey-brown coloring, the clear striations on its cap, and its tall stature. The cap is bell-shaped to convex, and the stem is fibrillose. Examination under a microscope reveals its two-spored basidia. This and other *Collybia*-like *Entoloma* species are also sometimes classified in the genus, or subgenus, *Nolanea*.

• **OCCURRENCE** Under conifers on humus-rich soil but also in acidic, deciduous woods and bogs. Widespread and common in Europe; not reported in North America.

• **SIMILAR SPECIES** *E. lanuginosipes* and *E. pallescens* are distinguished by heavily powdered stem surfaces and four-spored basidia.

FRUITING A few fruitbodies appear together or singly.



adnexed, honey-toned gills turn pink with age

well-spaced gills

Dimensions CAP ⇔ 0.5–3cm | STEM ↕ 5–8cm ↔ 2–4mm	Spores Pale pink	Edibility

Family ENTOLOMATACEAE	Species *Entoloma conferendum*	Season Spring–late autumn

STAR-SPORED ENTOLOMA

Despite an elegant stature and a strongly fibrillose, silvery stem, this species is not easy to identify. A microscope reveals its key identification feature: star-shaped spores. The reddish brown to gray-brown cap tends to be conical, aging to convex or umbonate; darker striations on the surface fade as it dries to pale gray-brown. The crowded gills are adnate, and the pale flesh smells and tastes yeasty.

• **OCCURRENCE** Mostly in grassy places in parks and playing fields but also in grass or moss in open woods. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** There are several *Entoloma* species that are similar in appearance, such as *E. cetratum* (p.109), which is warmer honey-brown, and *E. sericeum* (inset, right). All have spores that are angular and not star-shaped.

△ *ENTOLOMA SERICEUM*
Short-stemmed, with a dark sepia-brown to horn-gray cap, this common European species has a very strong rancid-yeasty smell. The spores are angular but not star-shaped. ☠

FRUITING Appears singly or in small groups.

Dimensions CAP ⟷ 2–4cm | STEM ↕ 3–6cm ↔ 3–7mm	Spores Pale pink	Edibility ☠

Family ENTOLOMATACEAE	Species *Entoloma nitidum*	Season Autumn

STEEL-BLUE ENTOLOMA

This is among the very few blue *Entoloma* species that are quite large and fleshy. It is very dark gray-blue with a convex to umbonate, smooth to fibrillose cap and a slender, twisted stem. The well-spaced, adnate gills are white, becoming pale pink with age. The white cap flesh has a blue tinge near the skin and has a faint smell. This species should not be eaten.

• **OCCURRENCE** Among moss in damp, acidic coniferous woods or tree stands. Widespread but mostly in northern Europe and adjacent parts of Asia; not reported in North America.

• **SIMILAR SPECIES** *E. bloxamii* is fleshier and prefers alkaline grassland. *E. euchroum* is smaller, bluer, and grows on deciduous trees.

FRUITING Appears singly or in small groups of fruitbodies in damp woods.

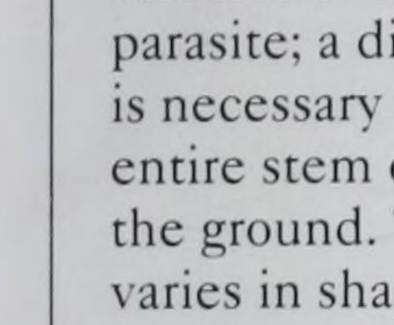
Dimensions CAP ⟷ 1–2.5cm | STEM ↕ 2–6cm ↔ 2–4mm	Spores Pale pink	Edibility 🍽

Family TRICHOLOMATACEAE	Species *Collybia fusipes*	Season Summer–autumn

EURO SPINDLE-SHANK COLLYBIA

A clustered habit and deeply rooting stems, with twisted fibers along their length, are distinctive features of this weak parasite; a digging tool is necessary to get the entire stem out of the ground. The cap varies in shape from convex to umbonate or irregular. The fox-brown stem, paler at the top, is very tough, with pale, fibrous flesh that is mild in taste and indistinct in smell.

• **OCCURRENCE** Attached to buried roots, mainly of old oak trees, in parks and older forests. Fairly common and widespread in the oak regions of Europe; not reported in North America.



fairly well-spaced, thick gills are cream with rust-brown spots

convex, reddish brown cap often has dark spots and darkens when wet

surface of cap is smooth and greasy

adnexed, notched to slightly decurrent gills are toothed

long portion of stem in soil

pale, fibrous flesh

SECTION

FRUITING In clusters on oak roots, rarely on beech.

Dimensions CAP ⊕ 4–8cm | STEM ↕ 4–8cm ↔ 0.5–1.5cm	Spores White	Edibility

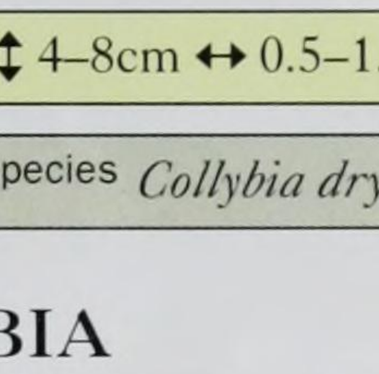
Family TRICHOLOMATACEAE	Species *Collybia dryophila*	Season Summer–early autumn

COMMON COLLYBIA

This species has a slightly greasy, convex to flat, pale leather-brown cap that can be distorted by a jelly mushroom parasite (species of *Syzygospora*). The smooth stem is similarly colored, paler toward the top. Not recommended as an edible because of reported digestive upsets.

• **OCCURRENCE** Mostly in woods or open grassy sites, on leaf litter and humus-rich soil. Widespread and very common in northern temperate zones.

• **SIMILAR SPECIES** *Collybia aquosa* has pale pink rhizoids, and *C. ocior* has a rather dark cap and pale yellow gills. Both are mostly late spring to summer fruiting. *Marasmius oreades* (p.117) fruits in rings in grass.



crowded, fairly broad gills

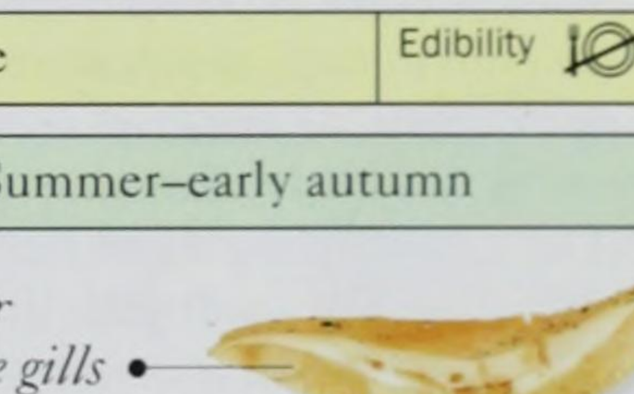
tan cap dries to pale leather-brown

adnexed or almost free gills

white to cream gills

stem base with white rhizoids

SECTION



FRUITING In troops on leaf litter and humus.

Dimensions CAP ⊕ 2–6cm | STEM ↕ 3.5–7cm ↔ 3–5mm	Spores Cream	Edibility

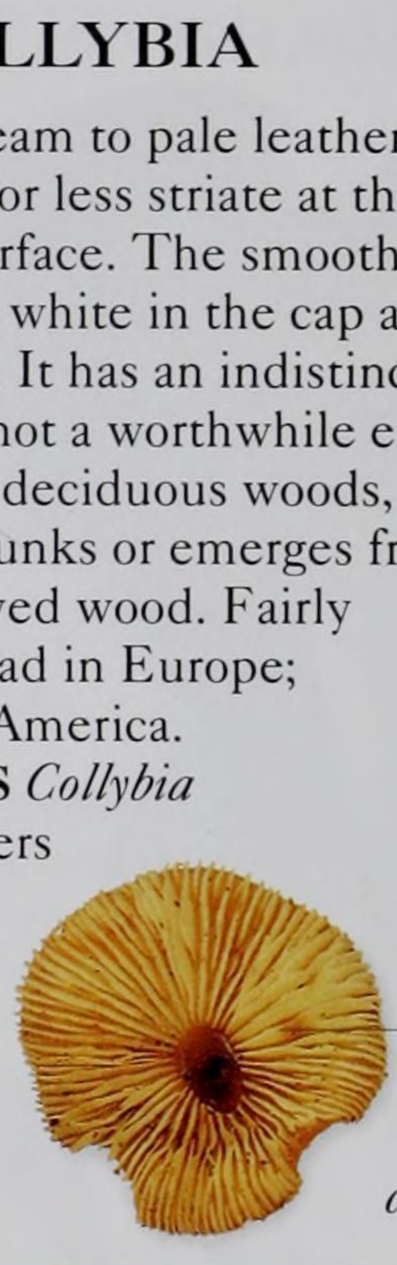
Family TRICHOLOMATACEAE	Species *Collybia erythropus*	Season Autumn–late autumn

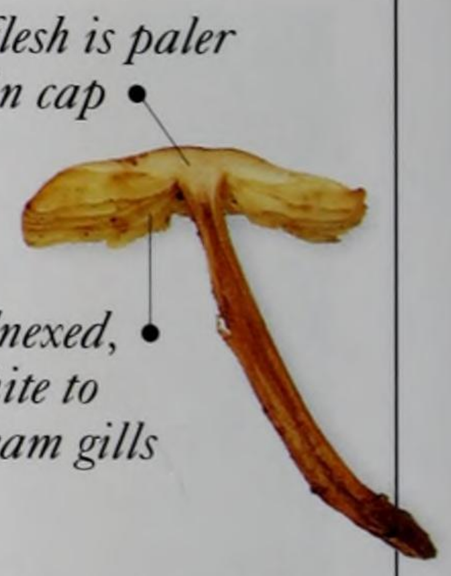
STALKED COLLYBIA

The convex to flat, cream to pale leather-brown cap of this species is more or less striate at the margin and has a slightly greasy surface. The smooth stem is fox-red. The flesh is white in the cap and red-brown in the stem. It has an indistinct smell and taste and is not a worthwhile edible.

• **OCCURRENCE** In deciduous woods, it grows on mossy tree trunks or emerges from half-buried, very decayed wood. Fairly common and widespread in Europe; not reported in North America.

• **SIMILAR SPECIES** *Collybia acervata* grows in clusters of fruitbodies on or under conifers. *C. dryophila* (p.111). *Marasmius* species (pp.114, 117, 138, 177) are also similar.





SECTION

FRUITING In clusters or, more rarely, singly.

Dimensions CAP ⇔ 1–4cm | STEM ↕ 3–7cm ↔ 2–5cm	Spores Pale cream	Edibility

Family TRICHOLOMATACEAE	Species *Collybia butyracea*	Season Late summer–early winter

BUTTERY COLLYBIA

This species is recognized by its greasy, umbonate cap, which changes color as it dries, creating zones of light and dark, and by its distinctly club-shaped stem base. The flesh is tough and fibrous and is hollow or has a soft pith in the stem; although edible, it is not worthwhile.

• **OCCURRENCE** In deciduous woods, mostly on humus-rich soil and in leaf litter. Widespread and common to abundant in northern temperate zones.

• **SIMILAR SPECIES** A darker form, *Collybia filamentosa*, grows in acidic woods and is sometimes regarded as a separate species.

SECTION

FRUITING In troops on leaf litter and soil.

Dimensions CAP ⇔ 3–6cm | STEM ↕ 4–7cm ↔ 0.5–2cm	Spores Pale cream	Edibility

Family TRICHOLOMATACEAE	Species *Collybia confluens*	Season Autumn

TUFTED COLLYBIA

Producing dense tufts of fruitbodies, this species has a tall, slender stem clothed in gray-white felt, and a rounded, very pale grayish white cap, smaller than those of most *Collybia* species. It has a faint, pleasantly aromatic smell and taste, but it is not considered a worthwhile edible.

• **OCCURRENCE** In deciduous and coniferous woods, on thick leaf litter; probably more common on rich, fertile soil. Widespread in northern North America.

• **SIMILAR SPECIES** *C. acervata* also grows in clusters, but it has reddish coloring, stems with felt on the lower half only, and is always associated with coniferous trees.

crowded, narrow, white to cream gills

FRUITING In dense tufts, sometimes in fairy rings.

SECTION

Dimensions CAP ⊕ 1–3cm | STEM ↕ 5–9cm ↔ 3–7mm	Spores Pale cream	Edibility

Family TRICHOLOMATACEAE	Species *Collybia peronata*	Season Autumn–late autumn

BITTER WOOLLY-FOOT COLLYBIA

The leather-brown cap of this species is bell-shaped to almost flat and has radial but irregular, dark brown streaks. Its main distinguishing features are its stem and its taste: the pale yellow stem is covered with felty yellow fibers at the base, becoming downy toward the top, and the inedible, strongly acrid-tasting flesh is white to sulfur-yellow, tough, and fibrous. Also useful in identification are its fairly well-spaced gills.

• **OCCURRENCE** In deciduous and coniferous woods on leaf litter. Widespread in northern temperate zones; common in Europe, rare in North America.

• **SIMILAR SPECIES** Both *Collybia alcalivirens* and *C. fuscopurpurea* have darker caps and stem felt that is not yellow. They both have a mild taste.

FRUITING In troops or small clusters of fruitbodies.

dry cap is leather-brown with darker streaks

SECTION

Dimensions CAP ⊕ 2.5–6cm | STEM ↕ 4–8cm ↔ 3–5mm	Spores Pale cream	Edibility

Family TRICHOLOMATACEAE	Species *Marasmius alliaceus*	Season Late summer–autumn

EURO GARLIC MARASMIUS

A pungent smell, reminiscent of rancid garlic, a fairly pale leather-brown cap, and an almost smooth black stem identify this large *Marasmius* species. The cap is convex or umbonate, and its surface may have darker striations, either at the margin or rarely almost to the center. They disappear with age. Despite the very rancid taste, some people use it as a garlic substitute in cooking.

• **OCCURRENCE** On buried branches or trunks in beech woodland. Widespread in the beech regions of Europe and adjacent parts of Asia.

• **SIMILAR SPECIES** *M. scorodonius* is smaller and paler but with a similar smell. It often occurs in grassland.

FRUITING Solitary or in troops in beech woodland.

DWARF FORM

Dimensions CAP ⇔ 1.5–4cm | STEM ↕ 7–15cm ↔ 3–6mm	Spores Off-white	Edibility

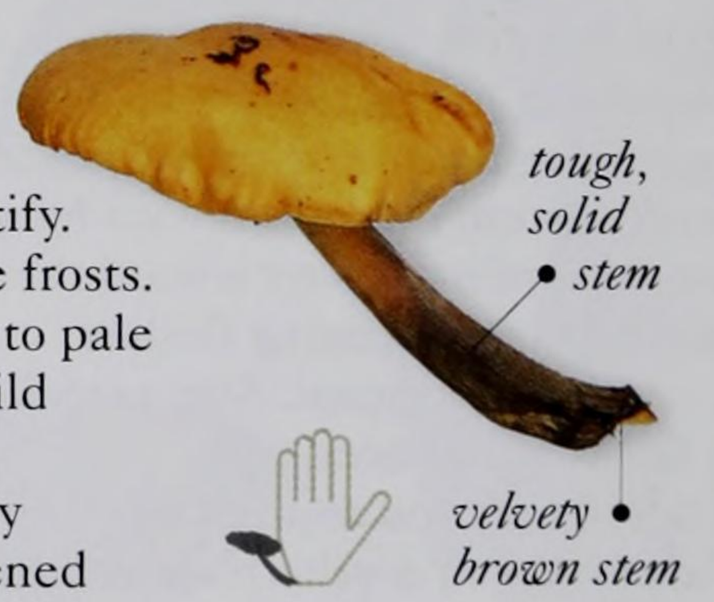
Family TRICHOLOMATACEAE	Species *Flammulina velutipes*	Season Late autumn–spring

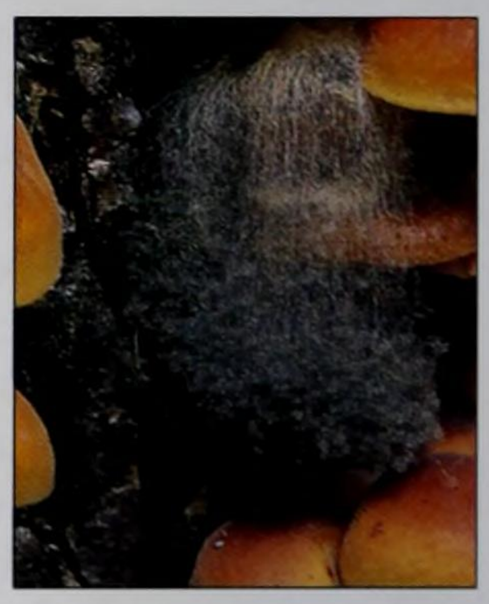
ENOKI COLLYBIA

The orange-brown cap and velvety, dark brown stem make this species easy to identify. It is one of the very few agarics that survive frosts. The gills are adnexed, crowded, and white to pale yellow. The thin, pale yellow flesh has a mild flavor; in Japan, it is cultivated for cooking.

• **OCCURRENCE** On living but unhealthy trees, especially willow or poplar; on weakened sites, such as where a branch has broken. Rarely found on conifers. Widespread and rather common in northern temperate zones.

• **SIMILAR SPECIES** *Flammulina fennae* and *F. ononidis* are rarer and have different habitats.





SYZYGITES MEGALOCARPUS △
A gray-white species, parasitic on a range of agarics, including *Flammulina*.

FRUITING In dense clumps of fruitbodies.

Dimensions CAP ⇔ 1–6cm | STEM ↕ 2–7cm ↔ 0.3–1cm	Spores White	Edibility

Family HYDNANGIACEAE	Species *Laccaria amethystina*	Season Autumn

PURPLE LACCARIA

When young, this very common species is easily identified by its amethyst coloring and thick, well-spaced gills; the coloring fades with age, making older specimens difficult to distinguish from the redder *Laccaria* species. The dry, slightly felted cap has an inconspicuous navel and pale margin striations. Its widely spaced gills are typical of the genus; microscopic examination reveals globose, spiny spores (9.5µm in diameter). It is edible, without a strong taste or smell, but contains minute amounts of arsenic.

• **OCCURRENCE** Mycorrhizal with a range of trees, including beech and conifers. Widespread and abundant in eastern North America.

FRUITING In troops on soil in leaf litter in moist woodland.

Dimensions CAP ⟷ 2–5cm | STEM ↕ 3–7cm ↔ 4–8mm	Spores Pale violet to white	Edibility

Family HYDNANGIACEAE	Species *Laccaria laccata*	Season Summer–early winter

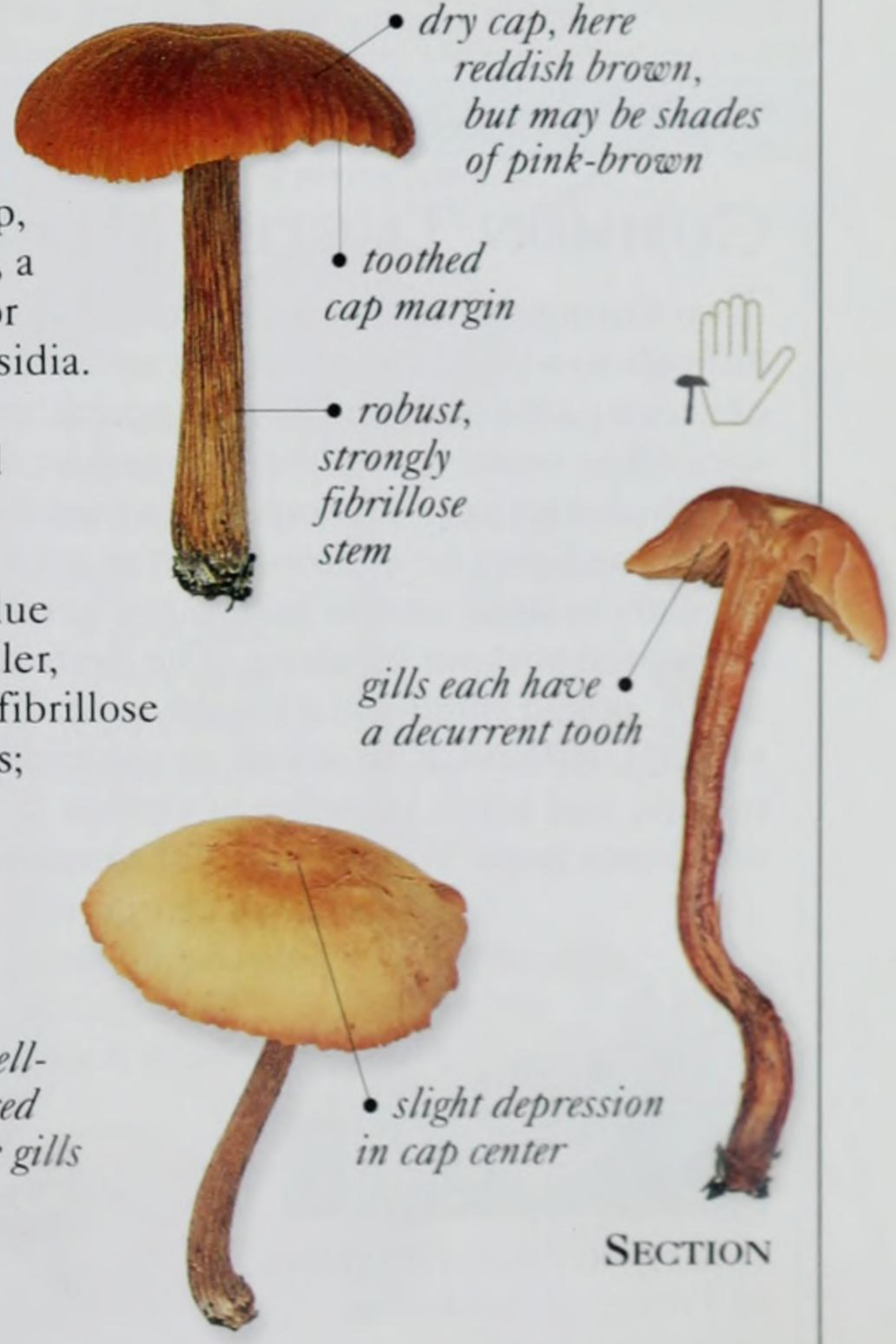
COMMON LACCARIA

This species appears in varying pink-brown shades and fades with age. Otherwise, it is similar to *Laccaria amethystina* (above), with a dry, slightly felted or scaly cap, often toothed at the margin and depressed in the center, a strongly fibrillose stem, and thick gills. It has spherical or near-spherical, spiny, 9 x 8µm spores and four-spored basidia. The thin, red-brown flesh has no distinct taste or smell.

• **OCCURRENCE** Mycorrhizal with trees in woods and parks; under willow in boggy places. Widespread and abundant in northern temperate zones.

• **SIMILAR SPECIES** *L. bicolor* has contrasting, pale blue gills. *L. fraterna* has two-spored basidia, as does the smaller, larger-spored *L. pumila*. *L. proxima* is larger with a more fibrillose stem. *L. ochropurpurea* is much larger and has purple gills; *L. trullisata* grows in sand along the East Coast and has elliptical, smooth spores.

FRUITING In troops, often on damp soil.



Dimensions CAP ⟷ 1–5cm | STEM ↕ 2–6cm ↔ 2–6mm	Spores White	Edibility

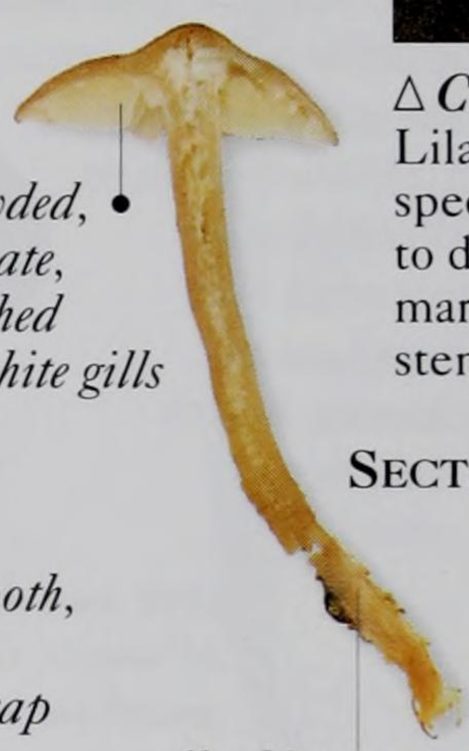
Family TRICHOLOMATACEAE	Species *Calocybe carnea*	Season Mid–late autumn

PINK LAWN TRICH

This species is easily identified by its pink cap and stem, contrasting with its crowded, sinuate, notched white gills, although it can be difficult to spot in deep grass. Indistinct in smell and taste, it is considered to be edible but the fruitbodies are so small that it is not really worth the effort.

• **OCCURRENCE** Grassland, including fertilized agricultural pasture and lawns. Widespread in northern temperate zones; uncommon in North America.

• **SIMILAR SPECIES** *Calocybe persicolor*, possibly the same species, is said to be duller and have a hairy stem base, often joined in clusters. *C. obscurissima* is even duller and grows on calcareous soil in woods. *Entoloma rosea* is a brighter shade with a pink spore deposit.



△ *CALOCYBE IONIDES* Lilac coloring identifies this species, which has an umbonate to depressed, sometimes wavy-margined cap, a club-shaped stem, and cream-white gills.

SECTION

FRUITING Singly or in small groups of fruitbodies.

Dimensions CAP ⊕ 1–4cm | STEM ↕ 2–4cm ↔ 3–8mm	Spores Cream-white	Edibility

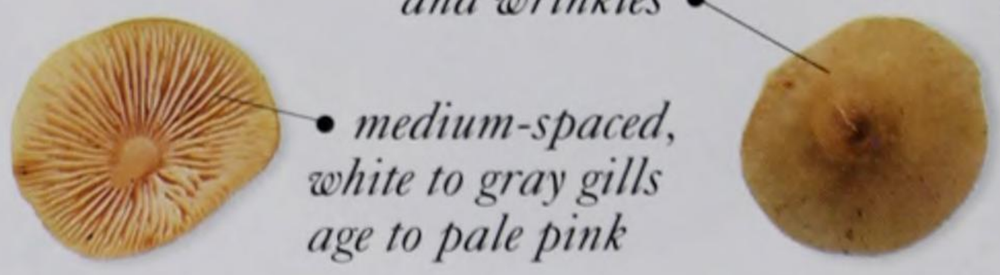
Family TRICHOLOMATACEAE	Species *Mycena galericulata*	Season Summer–early winter

COMMON TUFTED MYCENA

Two distinguishing features of this common but difficult-to-identify agaric are its unusual toughness compared to other *Mycena* species, and a noticeable tendency for the gills to take on a pale pink hue with age. The cap varies from bell-shaped to convex and may be yellow-brown or gray-brown. The similarly colored stem is hollow but very tough and can be twisted without breaking. The flesh has a yeasty, rancid smell and a similar taste.

• **OCCURRENCE** In woods on the trunks, stumps, and fallen branches of various types of deciduous trees. Widespread and common in northern temperate zones, extending south. Throughout North America.

FRUITING Appears in tufts and troops of fruitbodies.



SECTION

Dimensions CAP ⊕ 1–6cm | STEM ↕ 3–8cm ↔ 2–7mm	Spores Pale cream	Edibility

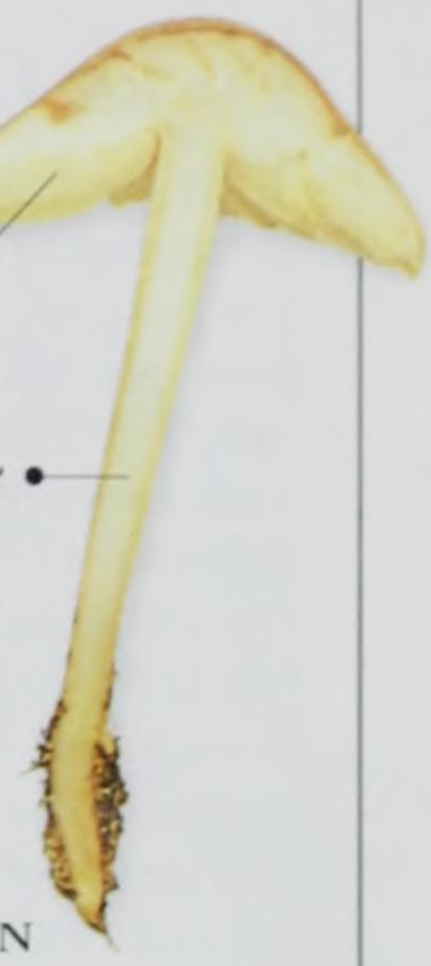
Family TRICHOLOMATACEAE	Species *Marasmius oreades*	Season Early summer–mid-autumn

FAIRY RING MARASMIUS

Producing characteristic rings in turf, this mushroom has a bell-shaped to convex cap, which becomes flatter with a broad umbo with age; it emerges tan and dries to pale leather-brown from the center. The off-white to pale buff stem is tough and solid. It is pleasant tasting, with a smell reminiscent of bitter almonds, but see SIMILAR SPECIES before eating.

• **OCCURRENCE** In grassland, including lawns. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** The poisonous *Clitocybe dealbata* (p.34) is found in the same grassy habitat. It is distinguished by its decurrent gills.



SECTION

FRUITING Appears in fairy rings among grasses.

Dimensions CAP ⇔ 1–5cm | STEM ↕ 3–6cm ↔ 3–7mm	Spores Off-white	Edibility

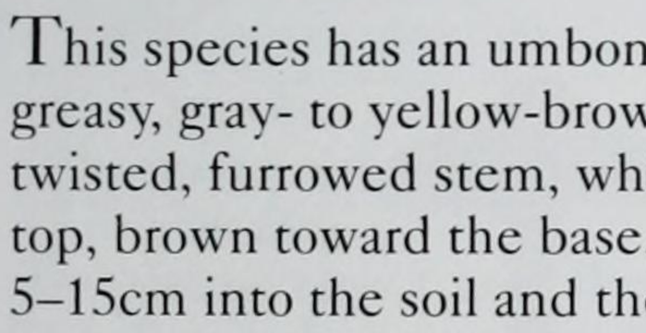
Family TRICHOLOMATACEAE	Species *Oudemansiella radicata*	Season Summer–late autumn

ROOTING COLLYBIA

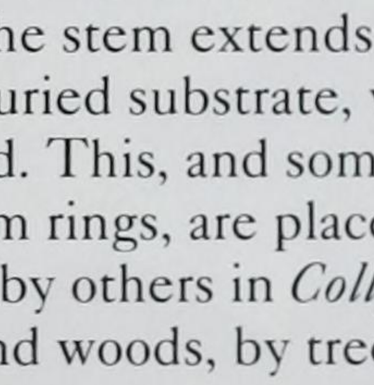
This species has an umbonate to flattened, greasy, gray- to yellow-brown cap and a twisted, furrowed stem, which is white at the top, brown toward the base. The stem extends 5–15cm into the soil and the buried substrate, with the same amount above ground. This, and some more velvety species, all lacking stem rings, are placed by some in the genus *Xerula*, and by others in *Collybia*.

• **OCCURRENCE** In parks and woods, by trees and stumps. Widespread in northern temperate zones; common in some regions; world distribution unclear.

• **SIMILAR SPECIES** *Oudemansiella pudens* and *O. caussei* have dry caps and strongly velvety stems.



FRUITING Appears singly or in scattered groups.



SECTION

Dimensions CAP ⇔ 3–10cm | STEM ↕ 5–15cm ↔ 0.5–1cm	Spores Pale cream	Edibility

Family TRICHOLOMATACEAE	Species *Mycena pelianthina*	Season Summer–autumn

DARK GILL-EDGE MYCENA

This somber-looking agaric has a large cap compared to most *Mycena* species. Convex to flat, it is purplish gray when wet, drying to pale gray-lavender. Margin striations are clearer when the cap is wet. The medium-spaced gills are broad and gray-purple with a serrated, almost black edge. The radishlike smell is similar to that of *M. pura* (below). Overall, it is like a *Collybia* (pp.111–113), but microscopic features, such as amyloid spores and large cystidia with colored contents, place it in *Mycena*.

• **OCCURRENCE** Mostly in rich, alkaline woodland, on thick leaf litter, mainly from beech trees. Widespread but rather local in Europe and adjacent parts of Asia.

toothed black gill edge

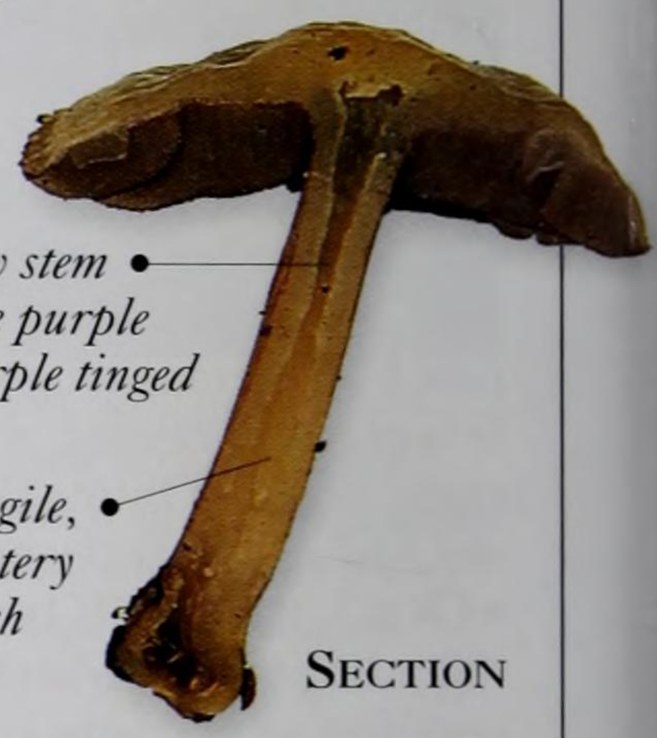
broad, narrowly attached gills

stem thicker towards base

cap surface dries from purplish gray to pale gray-lavender

hollow stem is pale purple or purple tinged

fragile, watery flesh



SECTION

FRUITING Singly or a few fruitbodies together.

Dimensions CAP ⟷ 3–6cm | STEM ↕ 4–8cm ↔ 4–8mm	Spores White	Edibility ☠

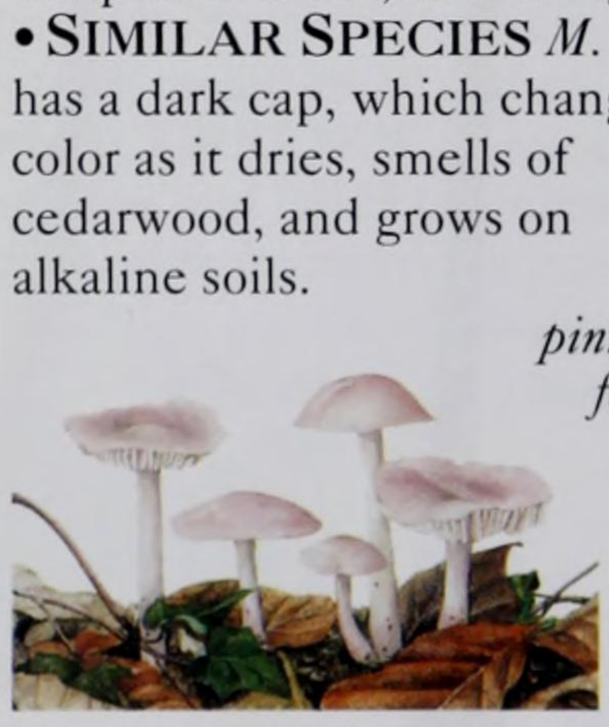
Family TRICHOLOMATACEAE	Species *Mycena pura*	Season Late summer–early winter

POISON RADISH GROUND MYCENA

This variable species comes in many different colors, usually with purple tints. Some are considered separate species or varieties; all smell of radishes. A large pink form, *Mycena rosea*, has been implicated in poisonings. The convex to umbonate cap shows a distinct striate margin when wet. The hollow, dry stem may have a yellow hue or can be paler but tinted in the cap color.

• **OCCURRENCE** In wooded and open habitats on humus-rich soil. Common in northern temperate zones, extending south.

• **SIMILAR SPECIES** *M. diosma* has a dark cap, which changes color as it dries, smells of cedarwood, and grows on alkaline soils.



FRUITING Singly or in small groups on rich soil.

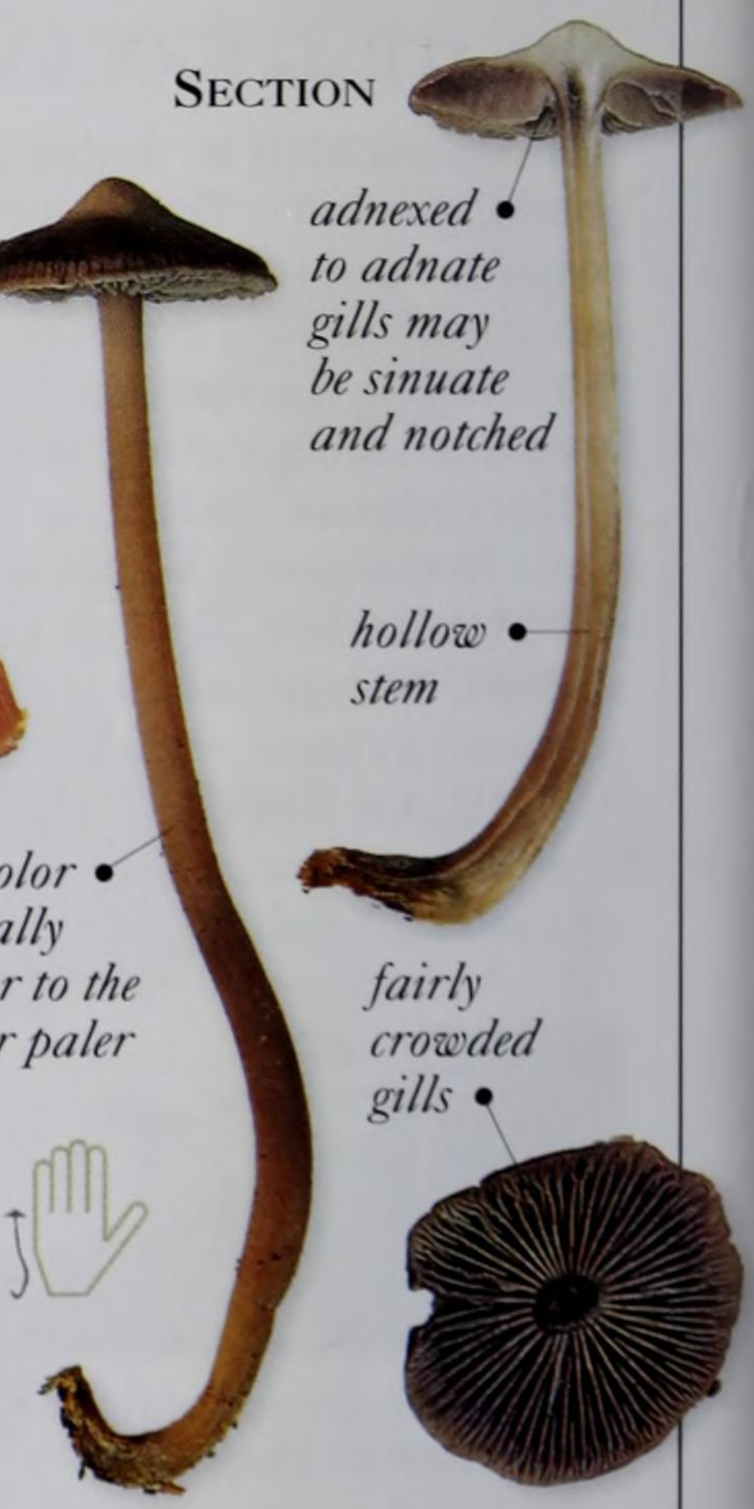
pink-colored form, also known as M. rosea

stem color is usually similar to the cap, or paler

adnexed to adnate gills may be sinuate and notched

hollow stem

fairly crowded gills



SECTION

Dimensions CAP ⟷ 2–6cm | STEM ↕ 3–9cm ↔ 0.3–1cm	Spores White	Edibility ☠

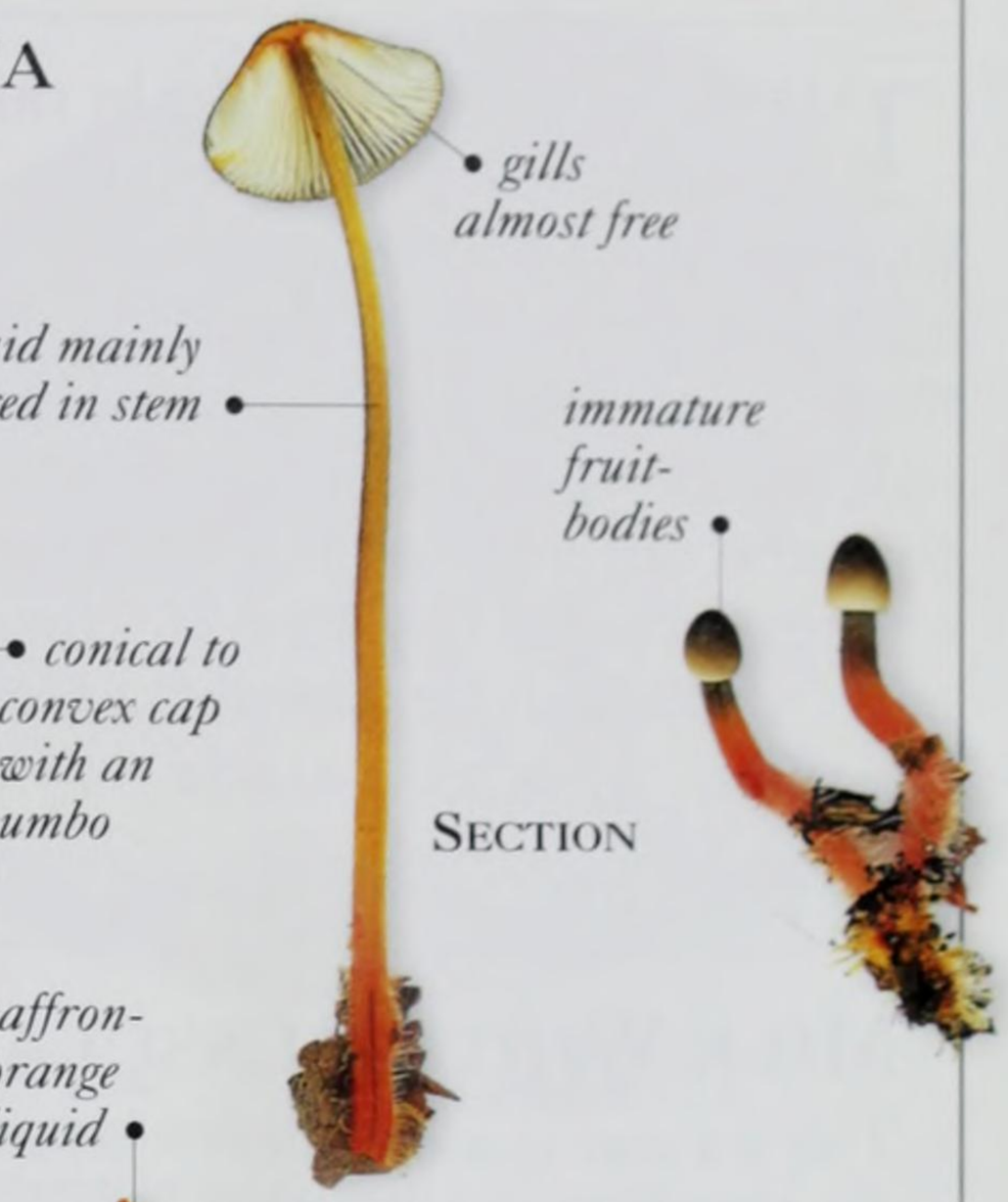
Family TRICHOLOMATACEAE	Species *Mycena crocata*	Season Late summer–autumn

EURO ORANGE-STAINING MYCENA

Conical to convex and more or less umbonate, the cap of this species is brown-gray with a paler margin and striations. Its stem exudes a saffron-orange liquid when cut or broken, leading to its other common name, Orange-milking Mycena. The lower stem is also saffron-orange; the upper part is paler. The well-spaced gills are white, staining yellow.

• **OCCURRENCE** Almost exclusively associated with beech, found mainly on fallen, often half-buried branches or in thick leaf litter. Widespread in beech regions within Europe and locally very common; also found in Japan.

• **SIMILAR SPECIES** A few other *Mycena* species produce colored or white liquid when damaged. *M. haematopus* (p.136) has blood-red juice, as does *M. sanguinolenta*; *M. galopus* (p.137) exudes a white liquid.



FRUITING A few together or in troops of fruitbodies.

Dimensions CAP ⊕ 1–3cm | STEM ↕ 5–12cm ↔ 1–3mm	Spores Pale cream	Edibility

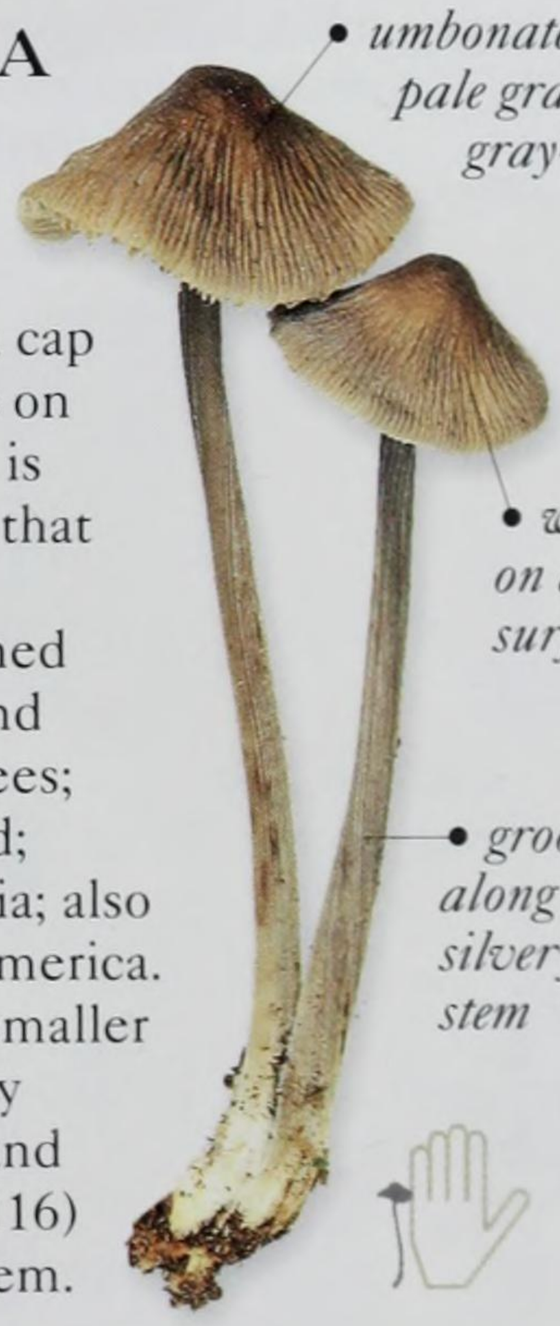
Family TRICHOLOMATACEAE	Species *Mycena polygramma*	Season Autumn–early winter

GRAY-LINED MYCENA

This fairly large, tough-fleshed *Mycena* species has a silvery stem with distinct grooves along its length. The pale gray to gray-brown cap is umbonate with radiating wrinkles on the dry surface. The off-white flesh is almost odorless. Occasionally forms that are entirely white can be found.

• **OCCURRENCE** In woods, attached to buried deciduous wood and around stumps; also on the base of living trees; occasionally on conifers. Widespread; common in Europe and adjacent Asia; also found in Japan and eastern North America.

• **SIMILAR SPECIES** *M. vitilis* is smaller with an equally tough, smooth, shiny stem. It occurs in the same habitat and is more common. *M. galericulata* (p.116) is even tougher and has a smooth stem.



FRUITING Appears singly or in small groups.

Dimensions CAP ⊕ 1–4cm | STEM ↕ 5–12cm ↔ 2–4mm	Spores White	Edibility

WITH CRUMBLY FLESH

THE SPECIES FEATURED in this subsection all belong to the genus *Russula*, and all have adnexed to adnate gills and crumbly flesh. The crumbly flesh is created by round tissue cells that are grouped in "nests" in the flesh. Russulas are very similar in appearance to the *Lactarius* (pp.43–55), which also have flesh that is crumbly. However, *Lactarius* species exude a milky liquid when cut and tend to have decurrent gills. Most *Russula* species have brighter-colored fruitbodies than those of the *Lactarius*.

All *Russula* species form mycorrhizal relationships (see pp.18–19) with trees or, in a few cases, shrubs and herbaceous plants. As a rule, mild-tasting russulas are edible, while those that taste hot are considered poisonous.

Family RUSSULACEAE	Species *Russula delica*	Season Summer–autumn

MILK WHITE RUSSULA

This is a large species, with a funnel-shaped cap, stout stem, and firm white flesh. Soil and leaf litter often stick to it, hiding its creamy white coloring. The well-spaced white gills may have a turquoise sheen. This species is known in North America as *Russula brevipes*.

• **OCCURRENCE** Mycorrhizal with coniferous and deciduous trees on well-drained soil. It is widespread and common in many parts of northern temperate zones.

• **SIMILAR SPECIES** *R. brevipes* var. *acrior* has more crowded gills, often with a turquoise zone around the stem top. *Lactarius vellereus* (p.44) is usually larger with a felted cap surface and white milk.

FRUITING A few together or in troops in woodland.

Dimensions CAP ⟷ 5–15cm | STEM ↕ 2–5cm ↔ 1.5–3cm	Spores White or cream	Edibility

Family RUSSULACEAE	Species *Russula foetens*	Season Summer–autumn

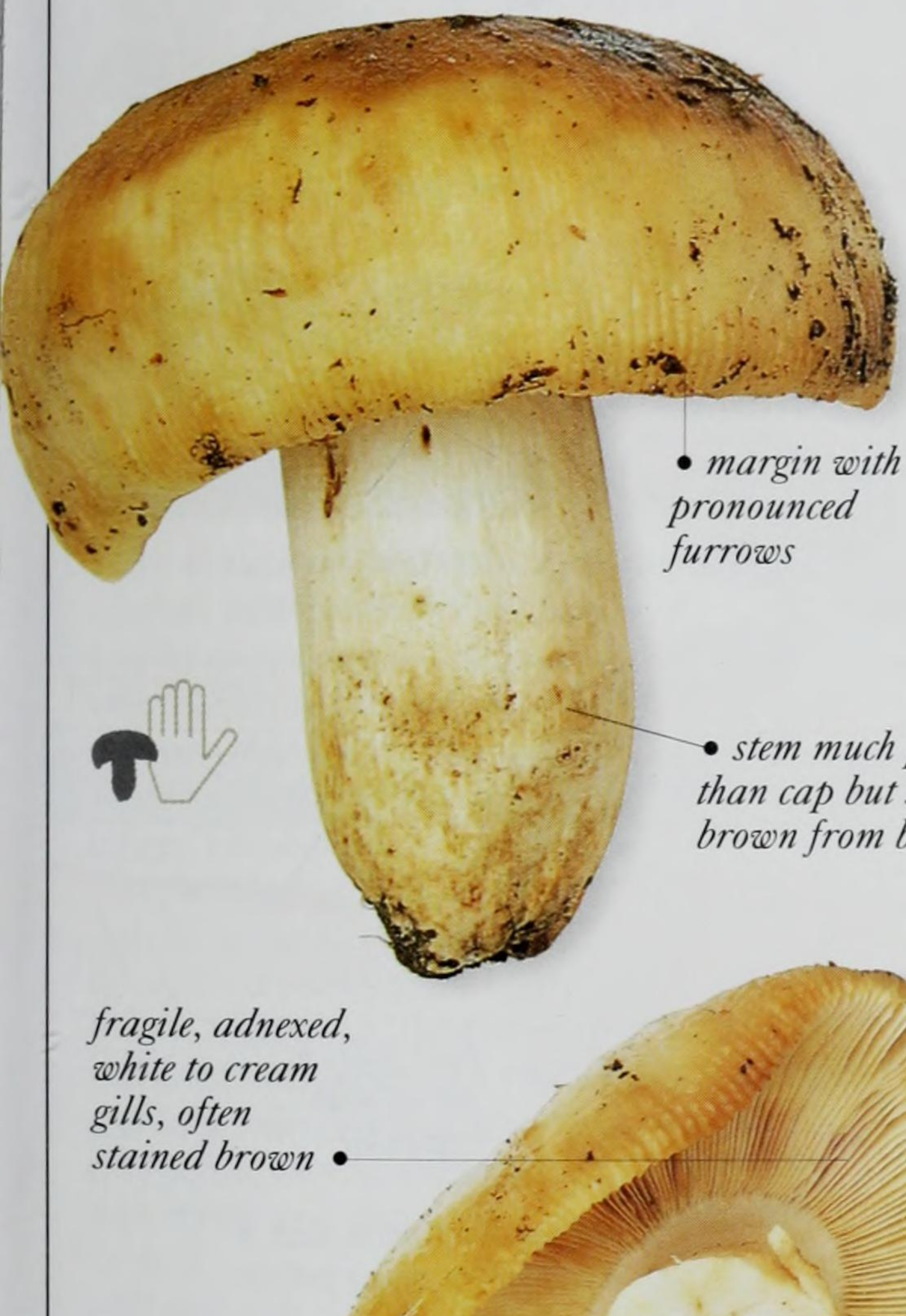
FETID RUSSULA

This rancid-smelling species has a fleshy, convex, greasy, orange-brown cap with a grooved margin. Its white stem, stained brown at the base, is short and almost barrel-shaped. The crumbly, very hot-tasting flesh is off-white and may be stained brown.

• **OCCURRENCE** Mycorrhizal with conifers and deciduous trees in woods. Widespread and common in many areas of northern temperate zones.

• **SIMILAR SPECIES** *Russula laurocerasi* smells of marzipan. *R. illota* has a rancid, slightly almondy smell and dark gill edges. The flesh of *R. subfoetens* stains yellow with potassium hydroxide (KOH). *R. foetens* has no reaction.

surface of cap is greasy, particularly in wet weather



margin with pronounced furrows

stem much paler than cap but stains brown from base

flesh off-white or stained brown

SECTION

short, barrel-shaped stem has chambers within

fragile, adnexed, white to cream gills, often stained brown

crowded gills

FRUITING Singly or in troops in woodland.

Dimensions CAP ⊕ 8–15cm | STEM ↕ 6–12cm ↔ 1.5–3cm	Spores Cream	Edibility

Family RUSSULACEAE	Species *Russula nigricans*	Season Summer–autumn

BLACKENING RUSSULA

This large species has an off-white to sooty brown cap with a depressed center, and a sturdy stem. The crumbly but firm flesh is off-white when cut, slowly turning red and then completely black. It tastes mild to bitter. Unlike most *Russula* species, the gills are of different lengths. Dried-up black fruitbodies persist until the following year.

• **OCCURRENCE** Mycorrhizal with deciduous trees and conifers, on well-drained soil. Widespread and common in many areas of northern temperate zones.

• **SIMILAR SPECIES** *R. albonigra* stains black (no red); *R. adusta* stains red then gray and tastes mild. *R. anthracina* and *R. acrifolia* have hot-tasting gills. *R. densifolia* has crowded gills and is smaller.

FRUITING Appears in troops or fairy rings.

Dimensions CAP ⇔ 5–20cm | STEM ↕ 3–8cm ↔ 1–4cm	Spores White	Edibility

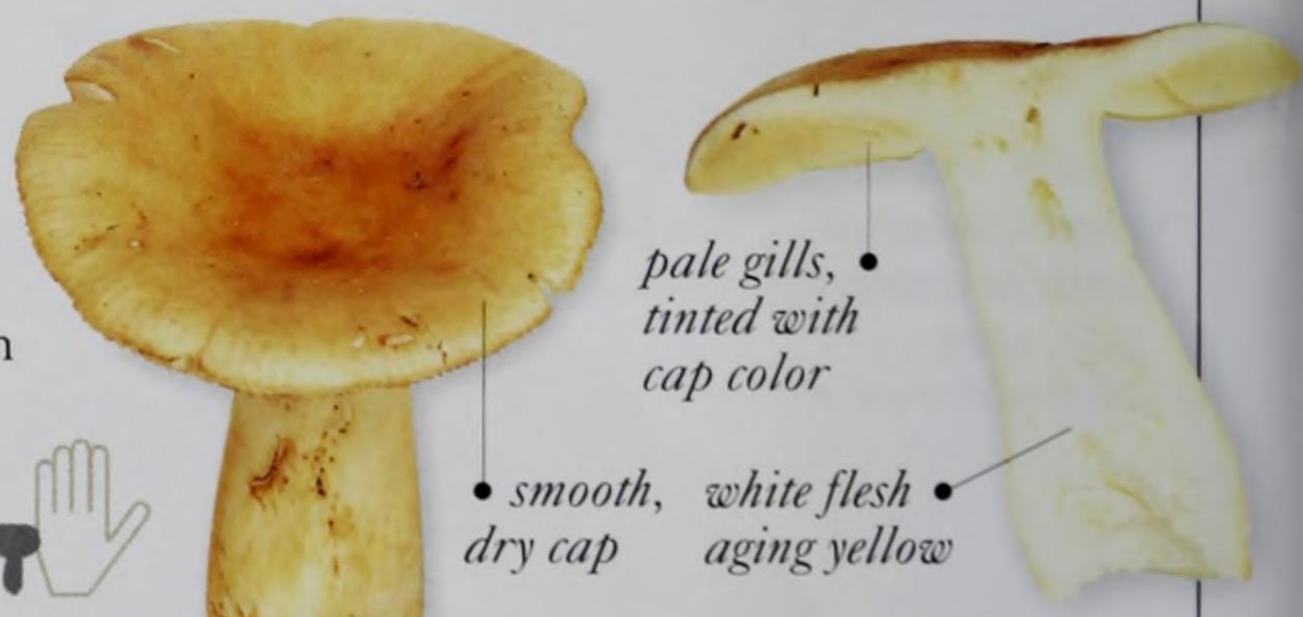
Family RUSSULACEAE	Species *Russula fellea*	Season Summer–autumn

GERANIUM RUSSULA

A very familiar ocher-orange-buff *Russula* species, this mushroom has a stout, smooth stem, expanding slightly toward the base, a convex, firm-fleshed cap with indistinct margin furrows, and a very bitter taste. The gills and stem are a paler ocher-buff shade.

• **OCCURRENCE** Mycorrhizal with deciduous trees, especially beech, on well-drained, acid soil in woods. Widespread in Europe; in North America it is represented by its close relative *R. simillima*.

• **SIMILAR SPECIES** *R. farinipes* has paler gills, stronger marginal grooves, and a powdery stem surface.



FRUITING Appears singly or in groups of fruitbodies.

Dimensions CAP ⇔ 3–6cm | STEM ↕ 3–7cm ↔ 1–2cm	Spores Off-white	Edibility

Family RUSSULACEAE	Species *Russula claroflava*	Season Summer–autumn

GRAYING YELLOW RUSSULA

This highly attractive, brightly colored species has a convex to flat, vivid yellow cap and edible, mild-tasting, firm white flesh. The gills are pale yellow and mainly full length (all reaching the stem). Both the flesh and the smooth, cylindrical to barrel-shaped white stem turn gray with age or when bruised.

• **OCCURRENCE** Mycorrhizal with birch in very damp or boggy woodland, where the soil may be so wet that sphagnum moss covers the ground. Widespread and common in northern temperate zones.

FRUITING Appears singly or in troops of fruitbodies.

• **SIMILAR SPECIES**
Russula claroflava has a stem that grays strongly on bruising. *R. ochroleuca* (below). *R. ochroleucoides* is a bitter-tasting American equivalent, growing in East Coast oak woods.

SECTION

Dimensions CAP ⟷ 5–10cm | STEM ↕ 4–10cm ↔ 1–2cm	Spores Ochre	Edibility

Family RUSSULACEAE	Species *Russula ochroleuca*	Season Summer–autumn

YELLOW-OCHER RUSSULA

One of the most common woodland agarics, this species is marked by the matte ocher-yellow coloring of its convex cap and its white gills. The cap sometimes has a green tinge. The barrel-shaped stem is white with a buff base, and the crumbly white flesh has a completely bland taste.

• **OCCURRENCE** Mycorrhizal with both conifers and deciduous trees in well-drained soil in woods. Widespread in northern temperate zones; common in Europe and parts of Asia.

• **SIMILAR SPECIES**
Russula fellea (p.122) and *R. claroflava* (above).

FRUITING Singly or in troops, mostly in woodland.

Dimensions CAP ⟷ 5–12cm | STEM ↕ 3–8cm ↔ 1–2.5cm	Spores White	Edibility

Family RUSSULACEAE	Species *Russula cyanoxantha*	Season Summer–autumn

VARIABLE RUSSULA

This large species has a convex to flat, green to wine-red cap, off-white gills, and a chunky, off-white stem. The flesh is firm but brittle and the gills are not crumbly but feel oily to the touch. It is a highly valued edible.

• OCCURRENCE

Mycorrhizal with deciduous trees, especially beech, but also with conifers; it prefers acidic soil. Widespread and common in parts of northern temperate zones.

• SIMILAR SPECIES

Russula integra and *R. vinosa* (see insets, below). *R. variata* occurring in North America has forked gills.

cap may be green to wine-red, or a mixture of both

cap is smooth and slightly greasy

chunky stem is off-white

gills are pliable and feel oily

crowded, adnexed, off-white gills

SECTION

firm but brittle flesh is pleasant tasting and can be eaten raw

△ *RUSSULA VINOSA*
This species, found with pine, has a variably brown-spotted, wine-red cap. The pleasant-tasting flesh and the white stem turn gray when cut or with age. The crowded, adnexed gills are cream, tinged gray with age. 🍽

△ *RUSSULA INTEGRA*
Distinguished by a yellow-buff spore deposit, this coniferous species varies in color. It has thick, well-spaced, almost free gills. The stem is white, aging to brown spotted. The firm white flesh tastes of almonds. 🍽

FRUITING Singly or in troops in well-drained woodland.

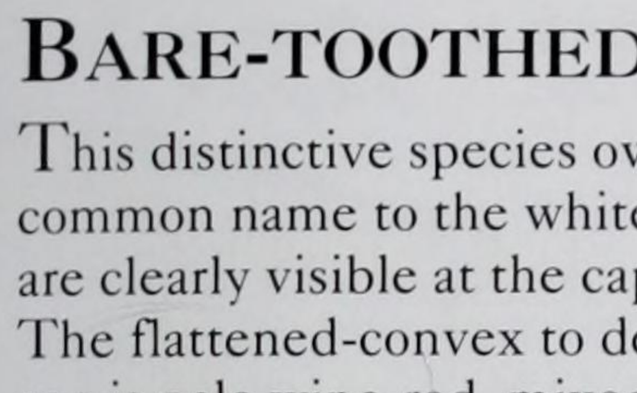
Dimensions CAP ⇹ 5–15cm | STEM ↕ 5–10cm ↔ 1–3cm	Spores White	Edibility 🍽

Family RUSSULACEAE	Species *Russula vesca*	Season Summer–autumn

BARE-TOOTHED RUSSULA

This distinctive species owes its common name to the white gills that are clearly visible at the cap margin. The flattened-convex to depressed cap is pale wine-red, mixed with brown, and rust-brown spots often mark the pointed, off-white stem base. The edible, firm white flesh has a nutty taste.

• **OCCURRENCE** Mycorrhizal with conifers and deciduous trees in well-drained woods. Widespread in northern temperate zones; common in Europe.



FRUITING Appears singly or in troops of fruitbodies.

Dimensions CAP ⇹ 5–10cm | STEM ↕ 3–6cm ↔ 1.5–2.5cm	Spores White	Edibility

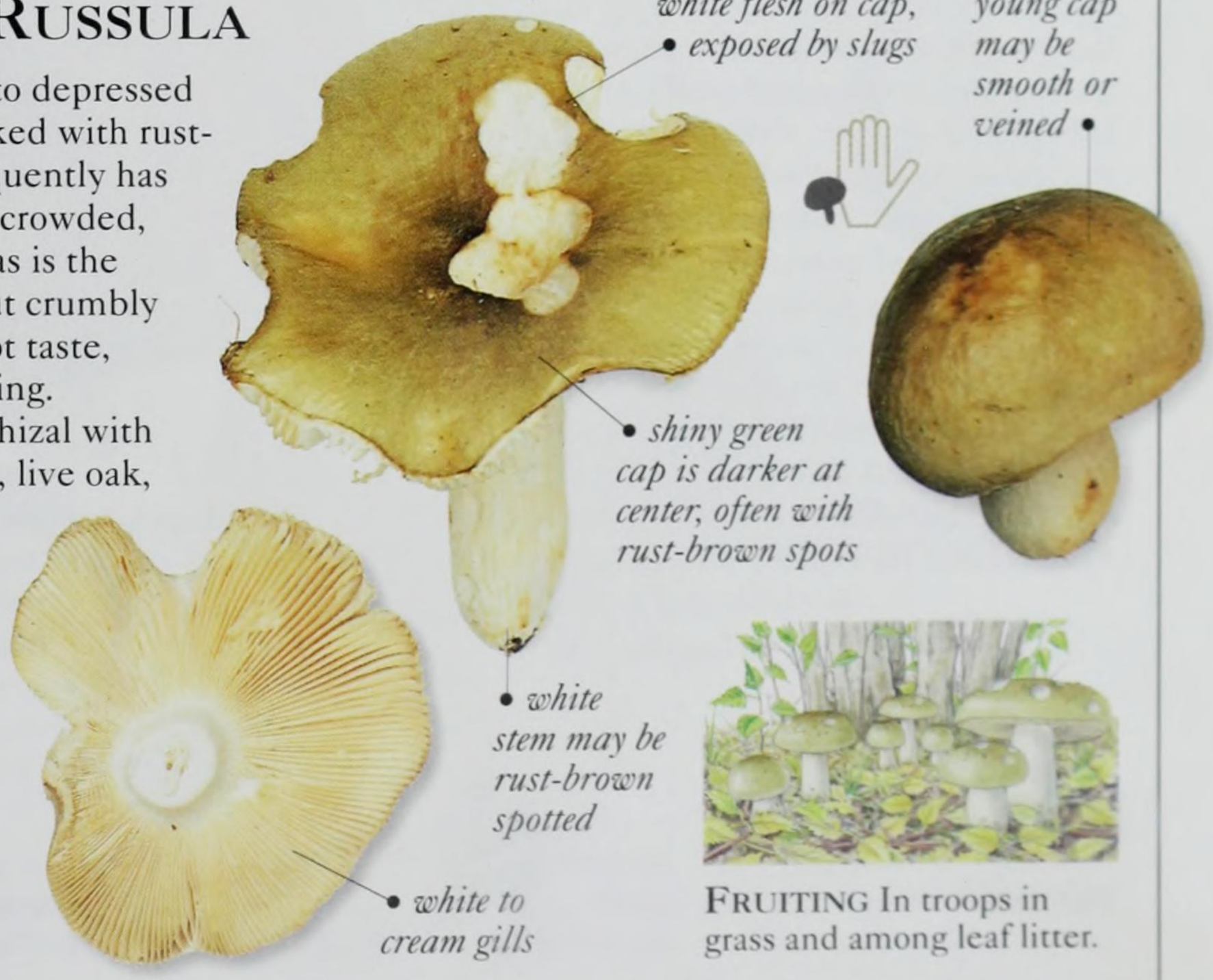
Family RUSSULACEAE	Species *Russula aeruginea*	Season Summer–autumn

TACKY GREEN RUSSULA

This species has a convex to depressed green cap that is often marked with rust- to red-brown spots and frequently has furrows at the margin. The crowded, almost free gills are white, as is the cylindrical stem. Its firm but crumbly white flesh has a slightly hot taste, which is destroyed by cooking.

• **OCCURRENCE** Mycorrhizal with birch; also found under oak, live oak, aspen, and some conifers. Widespread in northern temperate zones.

• **SIMILAR SPECIES** *Russula heterophylla* has firmer flesh. The cap of *R. virescens* (p.131) has small scales. Both are mild tasting. There is a green form of *R. xerampelina* (p.127).



FRUITING In troops in grass and among leaf litter.

Dimensions CAP ⇹ 4–9cm | STEM ↕ 4–7cm ↔ 1–2.5cm	Spores Cream	Edibility

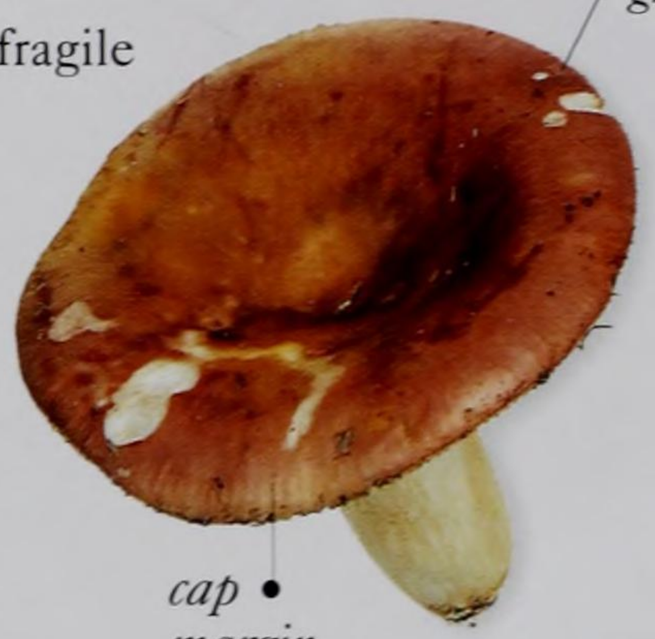
Family RUSSULACEAE	Species *Russula puellaris*	Season Summer–autumn

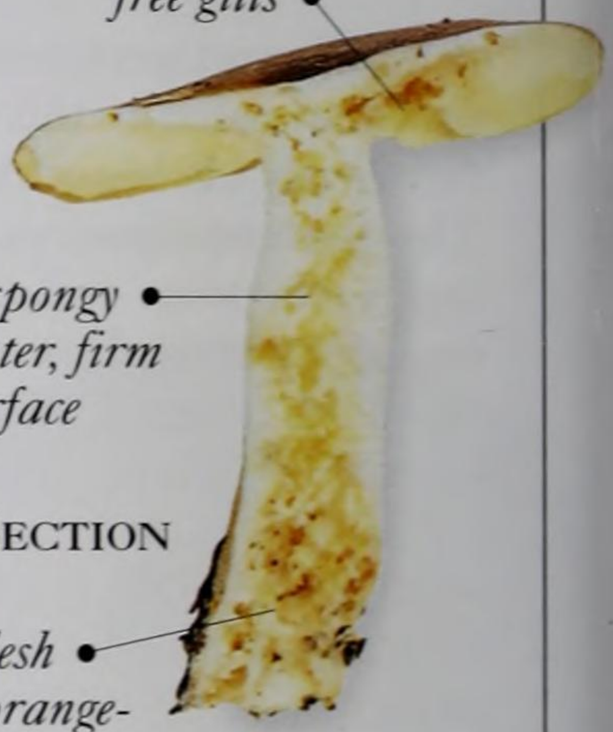
YELLOW-STAINING RUSSULA

The convex to depressed cap of this fragile species is purplish to reddish brown, possibly even almost black at the center with a paler margin. It takes on ocher-yellow hues with age and when bruised. From the cap margin, the skin can be peeled back almost to the center. It is a mediocre edible, with odorless, thin, mild white flesh.

• **OCCURRENCE** Mycorrhizal with conifers and deciduous trees. Widespread in northern temperate zones in Europe and northern North America.

• **SIMILAR SPECIES** *Russula odorata* has a strong, fruity smell and grows mostly with oak trees. *R. versicolor* has a hot taste and stains only slightly.





FRUITING Scattered or in troops in damp woods.

Dimensions CAP ↔ 3–6cm | STEM ↕ 3–6cm ↔ 0.7–1.5cm	Spores Dark cream	Edibility

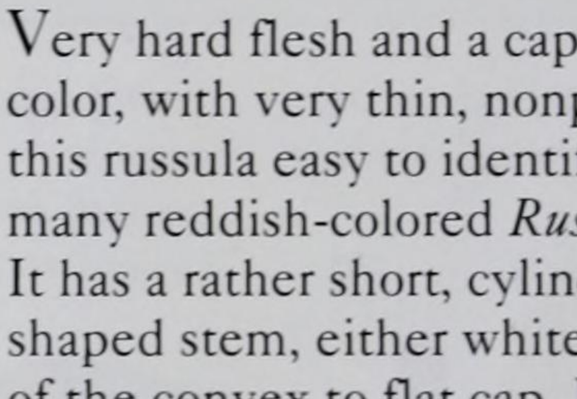
Family RUSSULACEAE	Species *Russula rosea*	Season Summer–autumn

ROSY FIRM RUSSULA

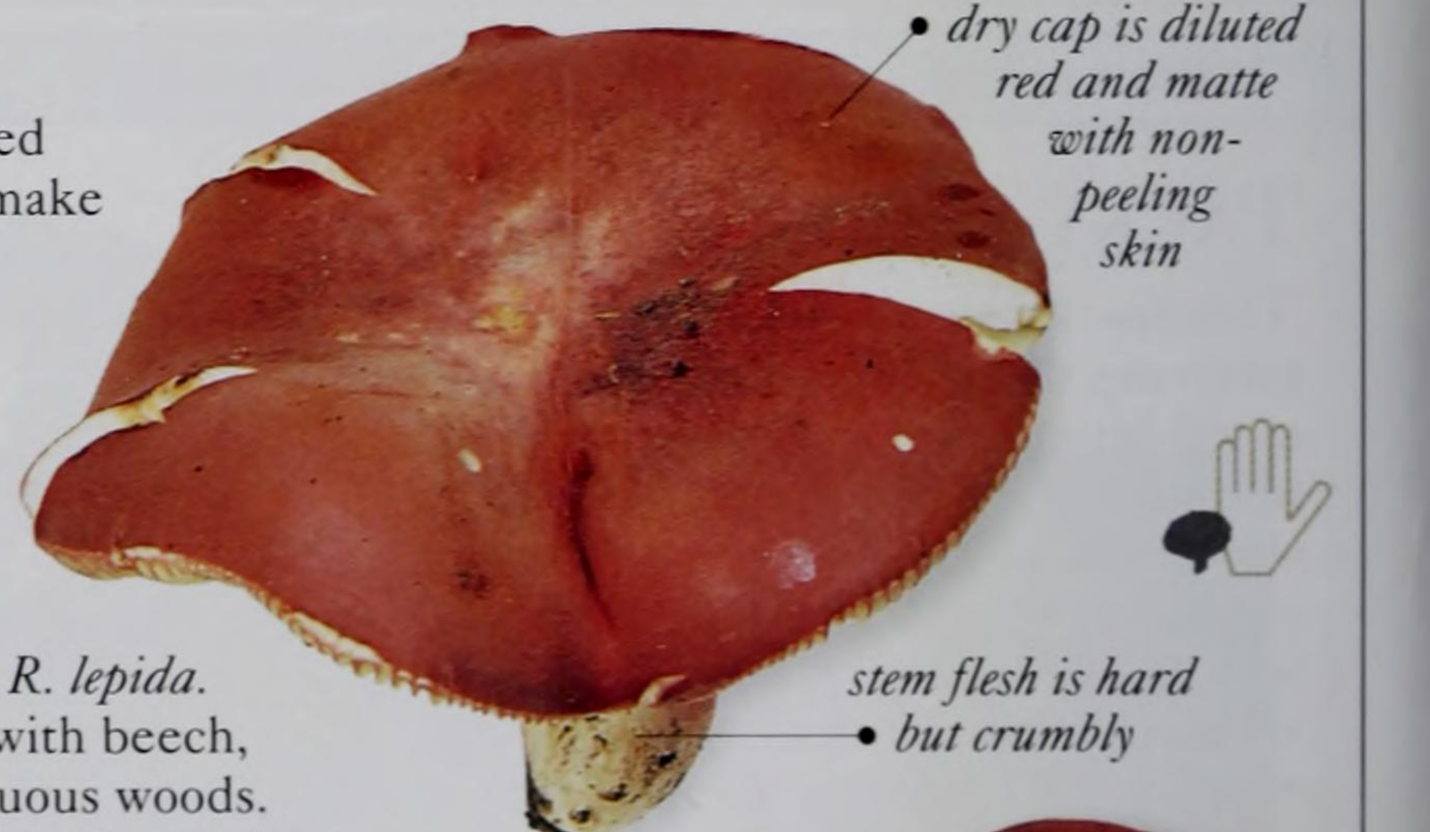
Very hard flesh and a cap of a diluted red color, with very thin, nonpeeling skin, make this russula easy to identify among the many reddish-colored *Russula* species. It has a rather short, cylindrical to club-shaped stem, either white or the color of the convex to flat cap. Its taste has been compared to the wood of a pencil. There is disagreement over its name and many experts prefer to call it *R. lepida*.

• **OCCURRENCE** Often mycorrhizal with beech, it is found on well-drained soil in deciduous woods. Widespread and common in European beech woods; reported in northeastern North America.

• **SIMILAR SPECIES** *R. velutipes* has peelable cap skin and more fragile flesh.



FRUITING Singly or in troops on woodland soil.



Dimensions CAP ↔ 4–12cm | STEM ↕ 3–8cm ↔ 1–3cm	Spores Pale cream	Edibility

Family RUSSULACEAE	Species *Russula turci*	Season Summer–autumn

IODINE RUSSULA

This species has a cap with a depressed center and a smooth margin, which may have a fine dustlike coating. It is colored in shades of wine-red, sometimes mixed with green, black, or orange. A distinct smell of iodine, especially at the base of the club-shaped stem, along with a pale ocher spore deposit, helps to identify it. The crumbly white flesh has a mild taste.

• **OCCURRENCE** Mycorrhizal with pine trees (mainly two-needled species) and possibly also with spruce. Widespread in Europe and also across northern North America.

FRUITING Appears in troops or a few together.

Dimensions CAP ⊕ 3–10cm | STEM ↕ 3–7cm ↔ 1–2.5cm	Spores Pale ocher	Edibility

Family RUSSULACEAE	Species *Russula xerampelina*	Season Summer–autumn

CRAB RUSSULA

Although treated as one species here, *Russula xerampelina* can be divided into a number of closely related species, all with a shellfishlike smell that intensifies with age, and flesh that turns dark green in contact with iron sulfate ($FeSO_4$). The smooth cap varies from dark red to green, and the cylindrical stem often has rust-brown spots; the whole fruitbody may stain brown with maturity. A choice edible when fresh, it has firm but crumbly white flesh, aging to brown.

• **OCCURRENCE** The different species occur in different habitats – woods and sand dunes – in various mycorrhizal associations. As a group of closely related species it is common and widespread in northern temperate zones.

SECTION

FRUITING In troops under willow or pine trees.

Dimensions CAP ⊕ 6–15cm | STEM ↕ 4–8cm ↔ 1.5–3cm	Spores Ocher	Edibility

Family RUSSULACEAE	Species *Russula paludosa*	Season Summer–autumn

TALL BOG RUSSULA

Taller than most, this large, attractive *Russula* species has a convex to depressed, orange-red cap, with yellow discoloration in the center and a slightly sticky surface when damp. The crowded, adnexed gills are off-white. Both the gill edges and the cap margin are often red. The cylindrical to narrowly club-shaped stem is white, flushed pink, and turns slightly gray with age. It is good to eat, with firm, crumbly, mild-tasting flesh, but see SIMILAR SPECIES.

• **OCCURRENCE** Mycorrhizal with conifers, especially pine. Widespread and locally common in northern temperate zones.

• **SIMILAR SPECIES** The poisonous and hot-tasting *R. emetica* (below) has no yellow coloring on the cap.

FRUITING Appears in troops or scattered under conifers often in boggy areas.

Dimensions CAP ⊕ 8–16cm | STEM ↕ 10–15cm ↔ 1–3cm	Spores Pale ocher	Edibility

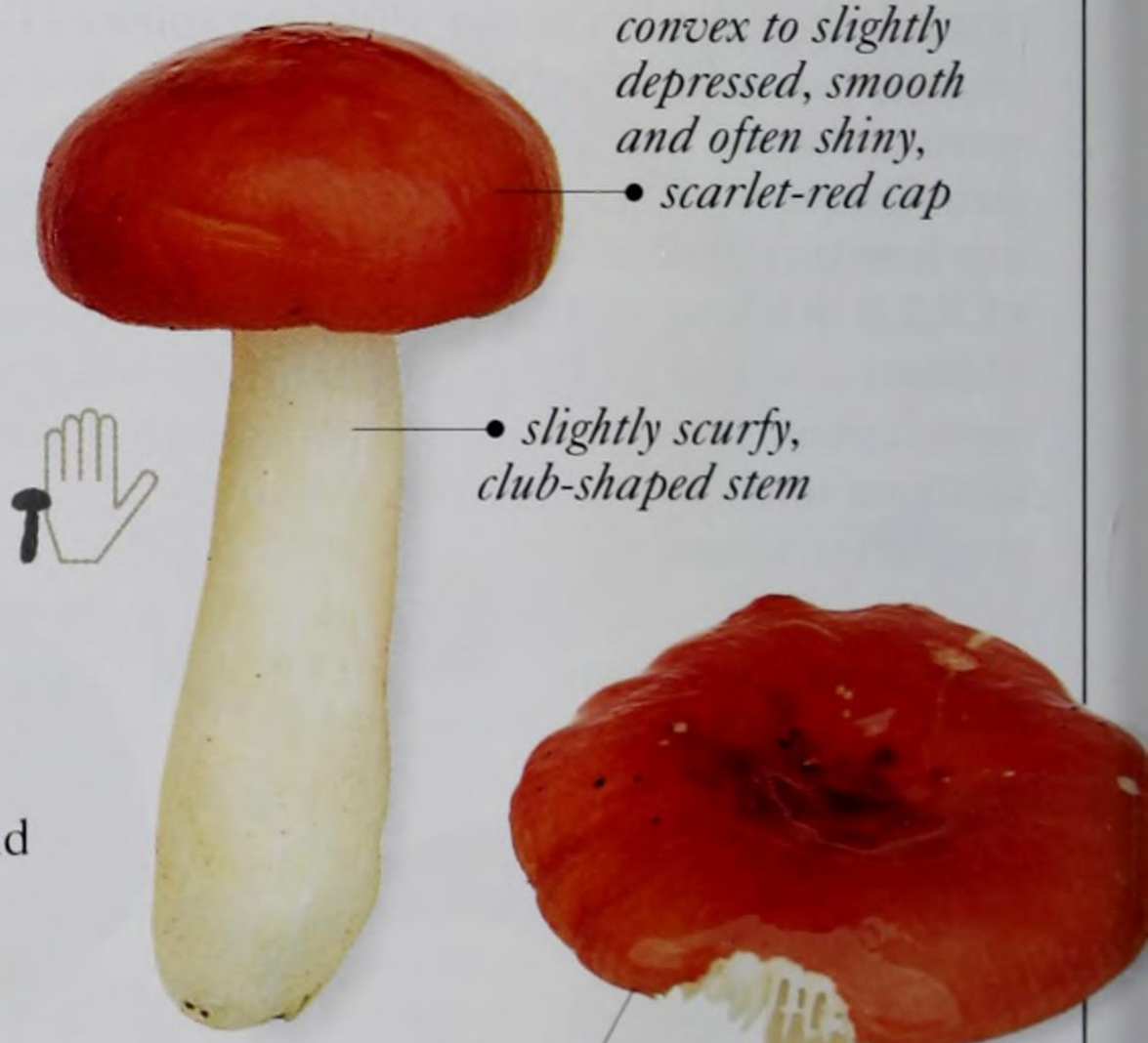
Family RUSSULACEAE	Species *Russula emetica*	Season Summer–autumn

EMETIC RUSSULA

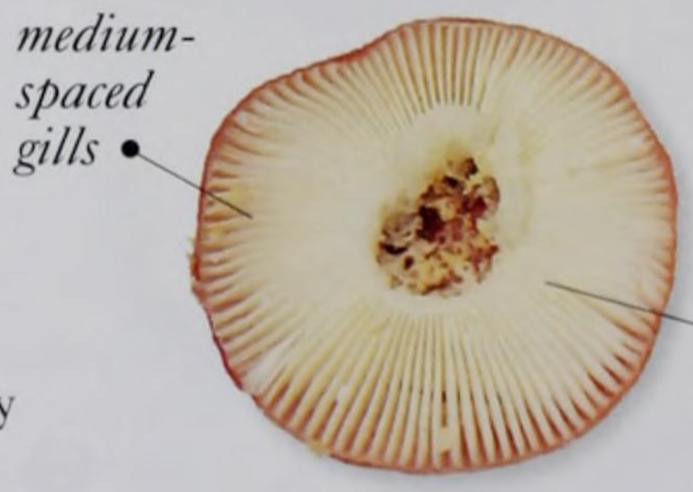
This species has a convex to slightly depressed, scarlet-red cap, the surface of which is smooth and often shiny, becoming sticky when wet. Its white stem is club-shaped with a scurfy skin. The crumbly, odorless white flesh has a very hot taste, which soon alerts an unwary eater, but in any case it is not highly poisonous.

• **OCCURRENCE** Mycorrhizal, mainly with coniferous trees in boggy areas. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *Russula silvicola* is the common dry woodland species across North America. *R. fageticola* usually grows under beech and also tastes hot. *Amanita muscaria* (p.146) has veil patches on the cap, a stem ring, and a bulb.



FRUITING In troops or singly in damp sites under conifers.



Dimensions CAP ⊕ 3–8cm | STEM ↕ 5–8cm ↔ 1–2cm	Spores White	Edibility

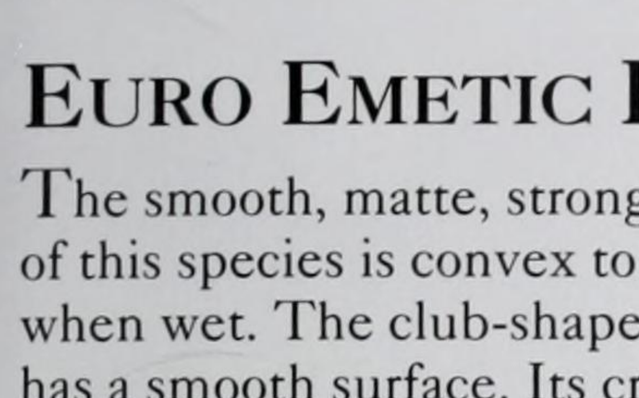
Family RUSSULACEAE	Species *Russula mairei*	Season Summer–autumn

EURO EMETIC RUSSULA

The smooth, matte, strongly scarlet-red cap of this species is convex to flat and sticky when wet. The club-shaped, off-white stem has a smooth surface. Its crumbly poisonous flesh is firm and white and smells slightly sweet.

• **OCCURRENCE** Mycorrhizal with beech trees in woods. Widespread and common in the beechwood regions of Europe and adjacent parts of Asia.

• **SIMILAR SPECIES** *Russula emetica* (p.128). *R. velenovskyi*, which is edible, is smaller, and typically occurs near birch.



FRUITING In troops or singly in well-drained beech woods.

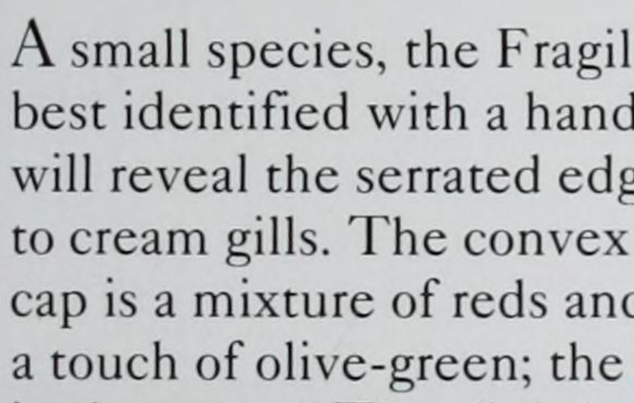
Dimensions CAP ⊕ 3–7cm | STEM ↕ 3–5cm ↔ 0.7–2cm	Spores White	Edibility ☠

Family RUSSULACEAE	Species *Russula fragilis*	Season Summer–autumn

FRAGILE RUSSULA

A small species, the Fragile Russula is best identified with a hand lens, which will reveal the serrated edges of its white to cream gills. The convex to depressed cap is a mixture of reds and purples, with a touch of olive-green; the colors are darkest in the center. The slightly club-shaped stem is white. The crumbly white flesh tastes very hot and is poisonous.

• **OCCURRENCE** Mycorrhizal with a variety of trees, often birch and oak, in woods. Widespread and locally common in northern temperate zones.



FRUITING In troops or small groups, rarely singly.

Dimensions CAP ⊕ 2–5cm | STEM ↕ 3–7cm ↔ 0.5–2cm	Spores White	Edibility ☠

Family RUSSULACEAE	Species *Russula sanguinea*	Season Summer–autumn

BLOOD-RED RUSSULA

Known as *Russula rosacea* in North America, this slightly poisonous species has a convex to depressed blood-red cap and a red-streaked stem that turns grayish pink with age. It has crumbly white flesh and can be identified by its moderately hot taste and the pale ocher color of its spore deposit.

• **OCCURRENCE** Mycorrhizal with conifers, mostly pine. Widespread in northern temperate zones.

• **SIMILAR SPECIES** *Russula helodes* has a lighter stem that turns a more distinct gray with age; often found in sphagnum moss.

FRUITING Appears singly or in troops on acid soil.

Dimensions CAP ⟷ 5–10cm | STEM ↕ 4–7cm ↔ 1–2cm	Spores Pale ocher	Edibility ☠

Family RUSSULACEAE	Species *Russula atropurpurea*	Season Summer–autumn

SPRING RUSSULA

This rather fleshy species has a convex cap, the usually depressed center of which is almost black; the rest of the cap surface is purple or violet, often spotted yellow. The cap color contrasts strongly with the white to cream stem and gills. The stem is fairly short and club-shaped, and the gills are crowded and adnexed. The white to gray flesh is slightly hot tasting and inedible.

• **OCCURRENCE** Mycorrhizal with oak trees, rarely found with other trees. Widespread in northern temperate zones.

• **SIMILAR SPECIES** *Russula brunneoviolacea* has a darker spore deposit, as does *R. romellii*.

FRUITING In troops beneath oak trees, mostly on acidic soil, in woodland sites.

Dimensions CAP ⟷ 4–10cm | STEM ↕ 3–6cm ↔ 1–2.5cm	Spores White	Edibility 🍽

Family RUSSULACEAE	Species *Russula sardonia*	Season Summer–autumn

PUNGENT RUSSULA

An attractive, comparatively large species with a convex, shiny dark purple cap and contrasting lemon-yellow gills; its purple to wine-red stem is club-shaped. It actually has a slightly fruity smell and a hot taste. The gills and white flesh turn pink when they come in contact with ammonia vapor.

• **OCCURRENCE** Mycorrhizal strictly with pine trees. Widespread and common in regions of northern temperate zones; western US.

• **SIMILAR SPECIES** *Russula queletii* is smaller, with paler gills, a paler spore deposit, and tastes just as hot. It does not react to ammonia.

FRUITING In troops under pine trees.

Dimensions CAP ⊕ 4–10cm | STEM ↕ 4–10cm ↔ 1–2.5cm	Spores Pale ocher	Edibility ☠

Family RUSSULACEAE	Species *Russula virescens*	Season Summer–autumn

GREEN QUILT RUSSULA

This firm-fleshed species is best identified by the velvety, yellow- to blue-green cap surface, which soon cracks, creating a scaly appearance. The stem is white but the base develops a brown-scaly surface. The brittle white gills are fairly crowded and adnexed. This mushroom turns orange-pink in contact with iron sulphate ($FeSO_4$).

• **OCCURRENCE** Mycorrhizal with deciduous trees, such as beech. Widespread and locally common in northern temperate zones.

• **SIMILAR SPECIES** *Russula crustosa* has orange tones in its cap and has an orange-yellow spore print.

FRUITING Appears singly or in small groups of fruitbodies on well-drained soil.

Dimensions CAP ⊕ 4–10cm | STEM ↕ 4–8cm ↔ 1–3cm	Spores White	Edibility 101

VERY SMALL WITH SMOOTH CAP

THERE ARE MANY small agarics with smooth caps, and they belong to an extremely wide range of genera and families, although, in this book, it is the small, gilled, white-spored members of the Tricholomataceae that predominate. Species included here may have a fine bloom on the cap but never have distinct hairs, coarse fibers, or scales (see pp.142–144).

Family TRICHOLOMATACEAE	Species *Lyophyllum palustre*	Season Summer–autumn

BOG LYOPHYLLUM

On a thin, pale gray-brown stem, the grayish brown cap of this species is convex, expanding to flat or slightly depressed. The cap surface is striated from the margin to its center, and it has inedible, thin flesh, which smells faintly of yeast. The white to pale gray gills are adnexed and medium spaced.

• **OCCURRENCE** Found only in boggy locations on sphagnum moss, which it kills. Widespread throughout northern temperate zones; in eastern North American bogs.

• **SIMILAR SPECIES** Other species found with sphagnum moss, such as *Galerina paludosa*, *G. tibiicystis*, *Omphalina sphagnicola*, and *O. philonotis*, usually have brown spores or decurrent gills.

FRUITING Appears in troops or fairy rings on sphagnum moss in boggy areas.

Dimensions CAP ⟷ 1–3cm | STEM ↕ 4–8cm ↔ 1–3mm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Baeospora myosura*	Season Autumn–late autumn

CROWDED-GILL CONE COLLYBIA

This pale brown member of the small genus *Baeospora* has a flat to slightly umbonate, dry cap and a powder-covered stem. It has a musty smell and indistinct taste. The gills are almost free.

• **OCCURRENCE** In parks and woods on cones and cone scales from various conifers, including spruce and pine. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *B. myriadophylla* is also pale brown but has brighter, more or less lilac gills. It grows mainly on fallen trunks of conifers and is rare or absent in most regions. Other mushrooms found on conifer cones include *Strobilurus esculentus* (p.133) and *Mycena seyneii*, which has a pale wine-pink cap and dark red-brown gill edges.

FRUITING A few on a cone or singly on detached scales.

Dimensions CAP ⟷ 0.5–2cm | STEM ↕ 1–4cm ↔ 1–2mm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Strobilurus esculentus*	Season Late autumn–spring

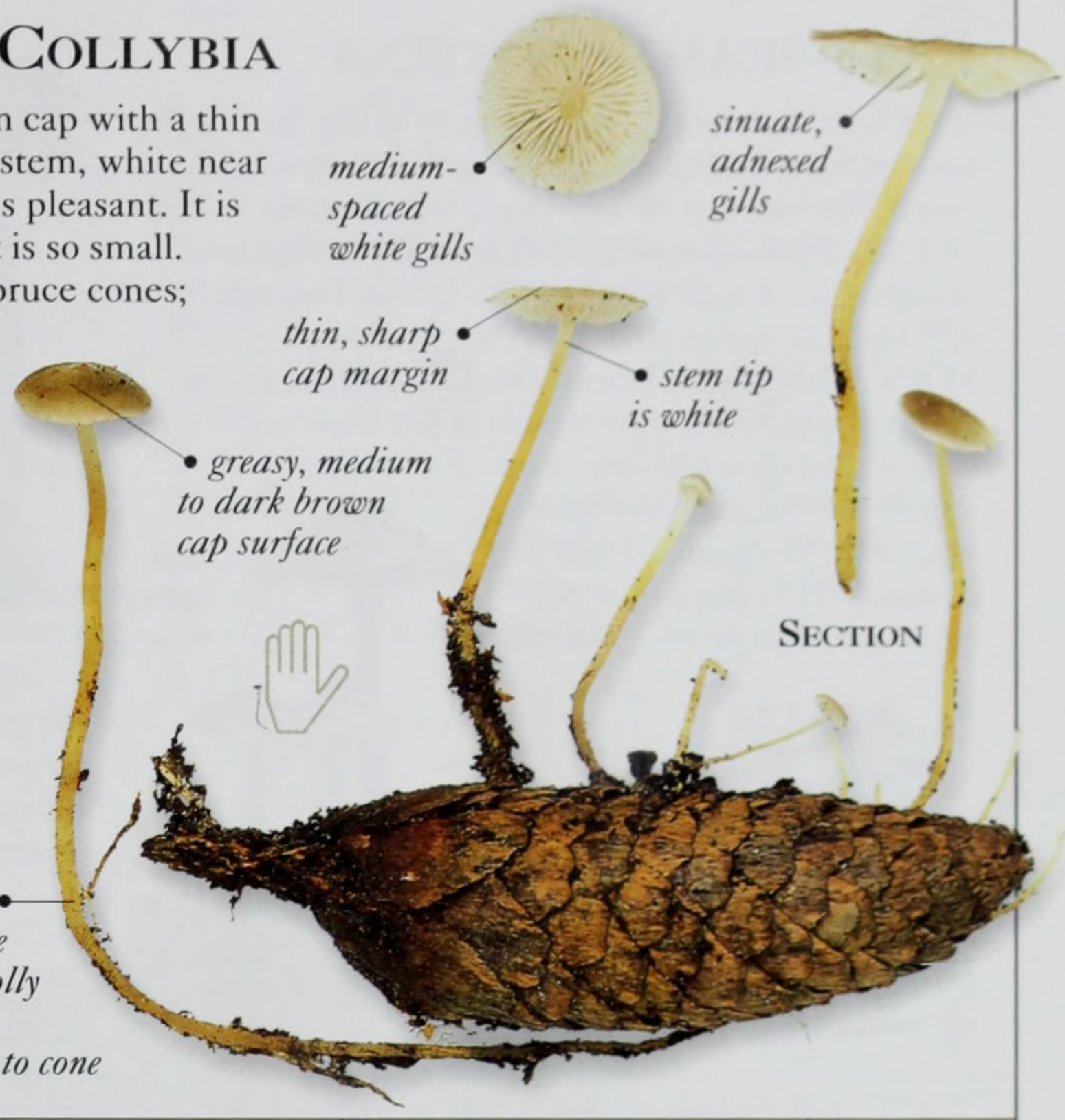
DISTANT-GILL CONE COLLYBIA

This small agaric has a convex brown cap with a thin margin and a smooth, orange-yellow stem, white near the top. The tough white flesh smells pleasant. It is edible but not worthwhile because it is so small.

• **OCCURRENCE** Only on fallen spruce cones; on cones that are above ground in damp areas. Widespread and common in European and Asian spruce regions; not reported in North America.

• **SIMILAR SPECIES** *Strobilurus stephanocystis* and *S. tenacellus* favor pine cones. Small *Collybia* species (pp.67, 111–113), differ in various microcscopic features.

FRUITING In small groups in spruce forests.



Dimensions CAP ⟷ 0.5–3cm | STEM ↕ 2–5cm ↔ 1–2.5mm	Spores Pale cream	Edibility

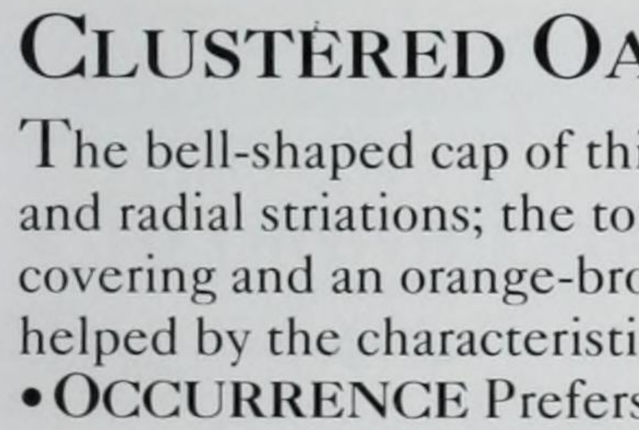
Family TRICHOLOMATACEAE	Species *Mycena inclinata*	Season Summer–early winter

CLUSTERED OAK MYCENA

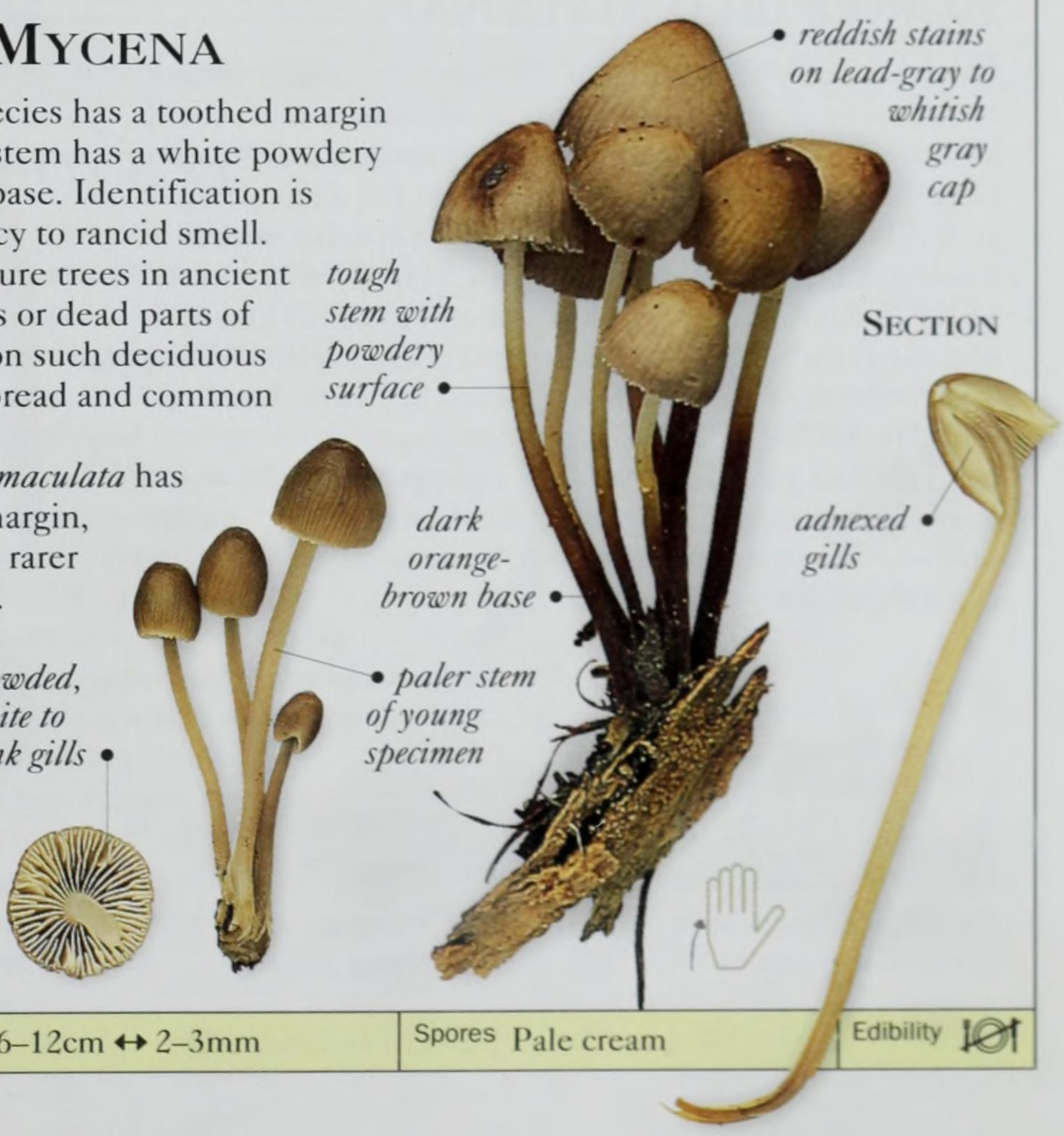
The bell-shaped cap of this species has a toothed margin and radial striations; the tough stem has a white powdery covering and an orange-brown base. Identification is helped by the characteristic spicy to rancid smell.

• **OCCURRENCE** Prefers mature trees in ancient forests. Mostly found on stumps or dead parts of standing oak trees; sometimes on such deciduous trees as sweet chestnut. Widespread and common in Europe and North America.

• **SIMILAR SPECIES** *Mycena maculata* has an earthy smell, a smooth cap margin, and a purplish brown stem. It is rarer but also tends to be overlooked.



FRUITING Appears in clusters of fruitbodies on wood.



Dimensions CAP ⟷ 1–4cm | STEM ↕ 6–12cm ↔ 2–3mm	Spores Pale cream	Edibility

Family TRICHOLOMATACEAE	Species *Mycena arcangeliana*	Season Autumn–early winter

LATE-SEASON MYCENA

This species is not easy to identify in the field, although the young fruitbodies often have a lilac stem. The cap can be any shape from convex to bell-like, in various shades of dull gray. If put inside an airtight can, a strong, antiseptic, iodine-like smell will become noticeable in a few minutes.

• **OCCURRENCE** In gardens, cemeteries, parks, and rich woods, on mossy bark at the base of living trees or bushes, or on woody debris, such as fallen branches. Widespread and common in Europe; rare but widespread in North America.

FRUITING Often in troops on varied woody debris.

Dimensions CAP ⟷ 1–2.5cm | STEM ↕ 3–7cm ↔ 2–3mm	Spores White	Edibility

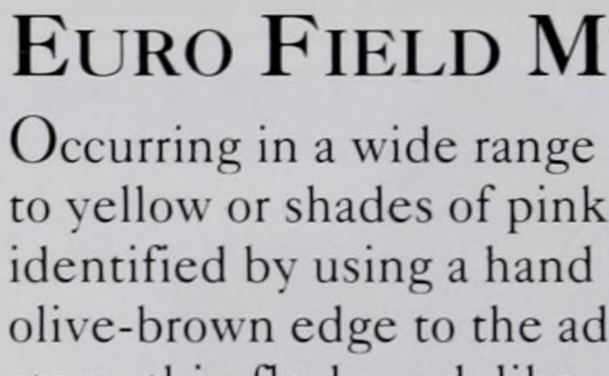
Family TRICHOLOMATACEAE	Species *Mycena olivaceomarginata*	Season Autumn

EURO FIELD MYCENA

Occurring in a wide range of cap colors from gray-brown to yellow or shades of pink, this mushroom is most easily identified by using a hand lens. This reveals a distinctive, olive-brown edge to the adnate gills. It has a fairly fragile stem, thin flesh, and, like many *Mycena* species, smells weakly of radishes; some forms smell faintly of chlorine.

• **OCCURRENCE** On mossy turf and in cut or grazed grassland, including open parks and coastal areas. Widespread and common in Europe; not reported in North America.

• **SIMILAR SPECIES** Other *Mycena* species have colored gill edges: red – *M. rubromarginata*, found on wood, and *M. seyneii*, found on cones; yellow – *M. citrinomarginata* and *M. flavescens*, occuring in grass or woodland litter.



FRUITING Singly or in troops in short grass.

Dimensions CAP ⟷ 0.7–1.5cm | STEM ↕ 3–6cm ↔ 1–2mm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Mycena epipterygia*	Season Summer–early winter

YELLOW-STALKED MYCENA

One of the comparatively few slimy *Mycena* species, *M. epipterygia* is identified by its vivid yellow stem, often tinged rusty brown, but otherwise quite variable in size, shape, and coloring. The smell is typically somewhat yeasty and rancid.

• **OCCURRENCE** On plant litter, mostly in coniferous woods; also in more open habitats on acidic soil with brambles and bracken. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** Other slimy *Mycena* species include *M. rorida*, the most slimy, which has a thick, slimy stem covering, thicker than the stem itself, and the slightly slimy-stemmed *M. belliae*, which grows only on reeds and has strongly decurrent gills.

FRUITING In troops or small groups of fruitbodies.

Dimensions CAP ⊕ 0.5–2.5cm | STEM ↕ 3–8cm ↔ 1–2.5mm	Spores Cream	Edibility

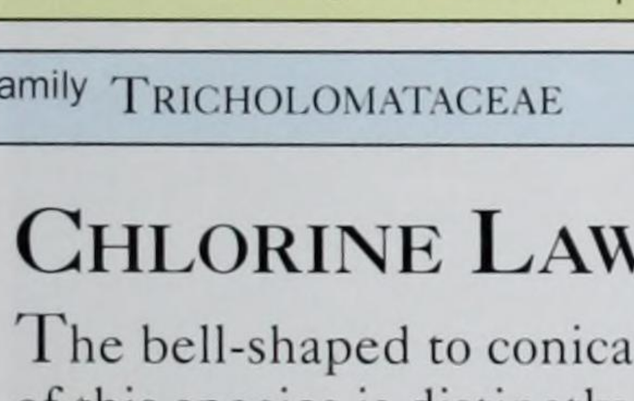
Family TRICHOLOMATACEAE	Species *Mycena leptocephala*	Season Summer–winter

CHLORINE LAWN MYCENA

The bell-shaped to conical, pale gray to lead-gray cap of this species is distinctly striate when moist. The stem is rather fragile, as is the watery flesh. This is by far the most common of a group of *Mycena* species that smell similar to bleach or chlorinated water.

• **OCCURRENCE** On mossy lawns and among tall grasses, woodland litter, or brambles. Widespread and common throughout northern temperate zones.

• **SIMILAR SPECIES** *M. abramsii* is larger with a less greasy cap. In North America, *M. alcalina* is a complex of species growing on decaying conifer wood. *M. capillaripes* has red gill lining (seen when viewed under a hand lens) and grows on conifer debris. All smell of chlorine.



FRUITING Singly or often in troops on mossy lawns.

Dimensions CAP ⊕ 0.6–1.5cm | STEM ↕ 3–7cm ↔ 1–2mm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Mycena filopes*	Season Autumn

IODINE MYCENA

This species is best identified with the aid of a microscope, which shows its spiny cystidia and other characteristics, and by its combination of fragile stem, gray coloring, and antiseptic, iodine-like smell. Both cap and stem have a covering of white bloom, and the cap has striations to its center.

• **OCCURRENCE** Mostly in deciduous woods, often along paths, on humus or small pieces of litter, but also under conifers on needle beds. Widespread and common in Europe and across northern North America and Pacific Northwest.

• **SIMILAR SPECIES** *Mycena arcangeliana* (p.134). *M. metata* tends to have pinkish hues and prefers more acidic conditions and conifer woods. Both smell of iodine and appear very similar under a microscope.

FRUITING Appears singly or in troops of fruitbodies.

medium-spaced gills

Dimensions CAP ⊕ 0.8–2cm | STEM ↕ 6–10cm ↔ 1–2mm	Spores White	Edibility

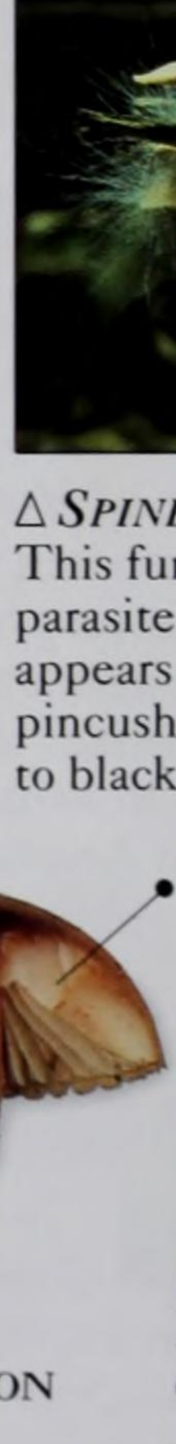
Family TRICHOLOMATACEAE	Species *Mycena haematopus*	Season Summer–autumn

BLEEDING MYCENA

The bell-shaped, red-brown cap of this species has a fine powdery surface and a toothed margin. When the fragile, red-brown stem, which is also covered with powder, is bruised or broken, the thin, watery flesh oozes a dark blood-red liquid.

• **OCCURRENCE** On rotten wood, in most types of forest. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *Mycena crocata* (p.119) has orange milk; *M. inclinata* (p.133) produces tight clusters but no milk. *M. sanguinolenta* is smaller with a more slender build and red-brown gill edges. It has red milk and normally grows on leaf litter.



△ *SPINELLUS FUSIGER*
This fungus is a common parasite on *Mycena* species and appears like pins stuck into a pincushion. It is closely related to black bread mold.

FRUITING In dense clusters of fruitbodies.

Dimensions CAP ⊕ 0.5–3cm | STEM ↕ 3–7cm ↔ 2–4mm	Spores Whitish cream	Edibility

Family TRICHOLOMATACEAE	Species *Mycena galopus*	Season Late summer–winter

WHITE MILK MYCENA

This highly variable species is most easily identified by the copious white liquid found in the stems of many specimens (noticeable at the stem base) and by the gills, which are well spaced compared to most *Mycena* species. A gray form is shown here, but there are also completely white and black forms; the black form is sometimes treated as a separate species, *M. leucogala*. The faint smell of this mushroom resembles radishes. Its edibility is unknown, but clearly its size makes it not worthwhile.

• **OCCURRENCE** In all types of woods on fallen conifer needles and on the leaf litter of deciduous trees; also on humus-rich soil in semiopen habitats. Widespread and common in Europe and east and west coasts of North America.

• **SIMILAR SPECIES**
M. erubescens has sparse, watery white milk, which slowly turns brownish red, and bitter flesh.

FRUITING Singly or in troops of fruitbodies.

Dimensions CAP ⇔ 0.5–2cm | STEM ↕ 3–7cm ↔ 1–2mm	Spores Pale cream	Edibility 101

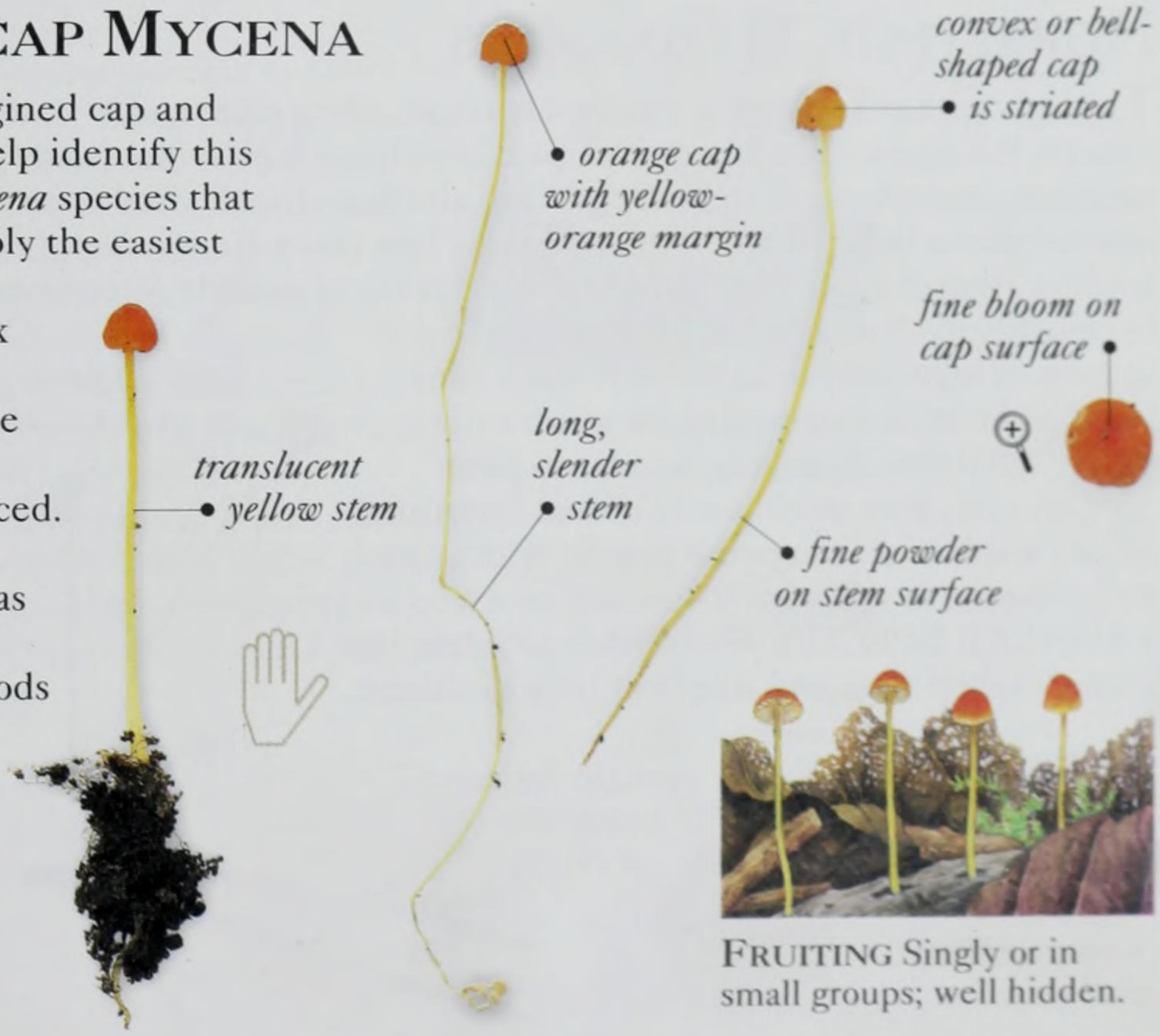
Family TRICHOLOMATACEAE	Species *Mycena acicula*	Season Spring–early winter

TINY ORANGE-CAP MYCENA

A vivid orange, yellow-margined cap and a translucent yellow stem help identify this species; among the tiny *Mycena* species that favor plant litter, it is probably the easiest to recognize. Both the long, slender stem and the convex to bell-shaped cap have a powder-covered surface. The adnexed, rather broad, pale yellow gills are medium spaced.

• **OCCURRENCE** On tiny pieces of woody litter, such as bark flakes; in moist places, such as under nettles; in woods and parks hidden deep among leaves. Widespread and fairly common in northern temperate zones.

• **SIMILAR SPECIES**
Rickenella fibula (p.36) has very arched, decurrent gills.



FRUITING Singly or in small groups; well hidden.

Dimensions CAP ⇔ 0.3–1cm | STEM ↕ 2–6cm ↔ 0.5–1mm	Spores Off-white	Edibility 101

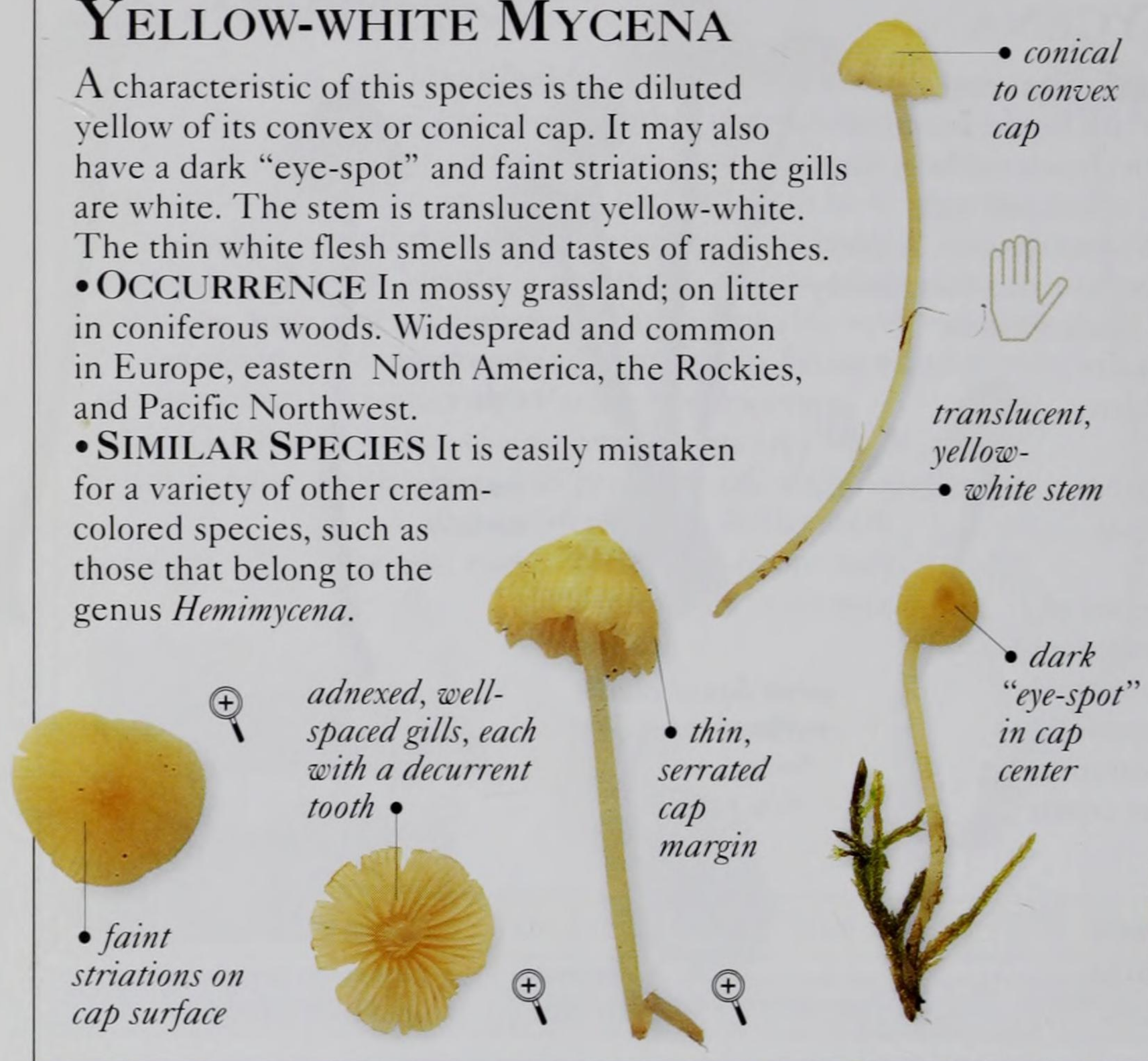
Family TRICHOLOMATACEAE	Species *Mycena flavoalba*	Season Autumn

YELLOW-WHITE MYCENA

A characteristic of this species is the diluted yellow of its convex or conical cap. It may also have a dark "eye-spot" and faint striations; the gills are white. The stem is translucent yellow-white. The thin white flesh smells and tastes of radishes.

• **OCCURRENCE** In mossy grassland; on litter in coniferous woods. Widespread and common in Europe, eastern North America, the Rockies, and Pacific Northwest.

• **SIMILAR SPECIES** It is easily mistaken for a variety of other cream-colored species, such as those that belong to the genus *Hemimycena*.



△ *MYCENA ADONIS*
This is a beautiful species, which fruits in modest numbers. It has a striking, coral-red cap, which fades with age, and a translucent white stem.

FRUITING In huge troops, often of over a hundred.

Dimensions CAP ⟷ 0.5–2cm | STEM ↕ 3–5cm ↔ 1–2mm	Spores Off-white	Edibility

Family TRICHOLOMATACEAE	Species *Marasmius androsaceus*	Season Summer–late autumn

HORSEHAIR MARASMIUS

This species has a very thin, extremely tough, shiny stem and a convex, flat-topped, dark-centered, pale brown cap with radial furrows, striations, and often wrinkles. Its gills are attached directly to the stem, instead of to a little wheel around the stem like many *Marasmius* species. It produces tough, horsehairlike threads of densely interwoven hyphae to colonize a new substrate, enabling it to grow in inhospitable habitats. It has a faint smell and a mild taste and is not worth eating.

• **OCCURRENCE** In pine woods, on pine needles and other small pieces of tree litter; also among sand dunes near pine stands. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *Micromphale perforans* has a finely felted stem and smells of rotten cabbage.

FRUITING In troops in a wide variety of sites.

Dimensions CAP ⟷ 0.3–1cm | STEM ↕ 2.5–5cm ↔ 0.3–0.5mm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Micromphale foetidum*	Season Autumn–late autumn

FETID MARASMIUS

Occasionally, this fairly small species can be detected by its strong smell alone, which is similar to that of rotten cabbage. It has a convex, smooth, orange-brown cap, darker at the center, with striations and furrows and a thin, sharp, upturned margin. The hollow stem is velvety black and widens at the top.

• **OCCURRENCE** Only on fallen branches in deciduous woods, preferring areas of rich alkaline soil. Widespread but local in northern temperate zones.

• **SIMILAR SPECIES** *Micromphale brassicolens* grows on beech twigs and leaves. It has more crowded, paler gills. *M. perforans* is smaller and occurs on pine needles. Both smell rotten.

FRUITING Appears in dense groups of fruitbodies.

Dimensions CAP ⊕ 0.5–3cm | STEM ↕ 1–4cm ↔ 2–4mm	Spores Off-white	Edibility

Family TRICHOLOMATACEAE	Species *Marasmiellus ramealis*	Season Summer–autumn

TWIG MARASMIUS

This tiny *Marasmiellus* species has a cream to pale leather-brown cap that is convex, aging flat, and finely wrinkled and furrowed. The short, curved, pale tan stem is clothed in pale scales at its base. Similar in color to the stem, the flesh is thin, tough, and fibrous. The broad gills are well spaced; the smooth spores, 9 x 3µm, are spindle-shaped to ellipsoid.

• **OCCURRENCE** In damp woods, growing on dead sticks and twigs or *Rubus* (raspberry and blackberry) canes. It will also tolerate fairly dry conditions. Widespread and common in Europe and North America.

• **SIMILAR SPECIES** *M. candidus* has a whiter cap and a black stem base. *M. vaillantii* is best distinguished by microscopic examination of the cystidia and spores.

FRUITING Appears in crowds of fruitbodies.

Dimensions CAP ⊕ 0.3–1.5cm | STEM ↕ 0.5–2cm ↔ 0.5–1.5mm	Spores White	Edibility

Family CORTINARIACEAE	Species *Galerina calyptrata*	Season Summer–autumn

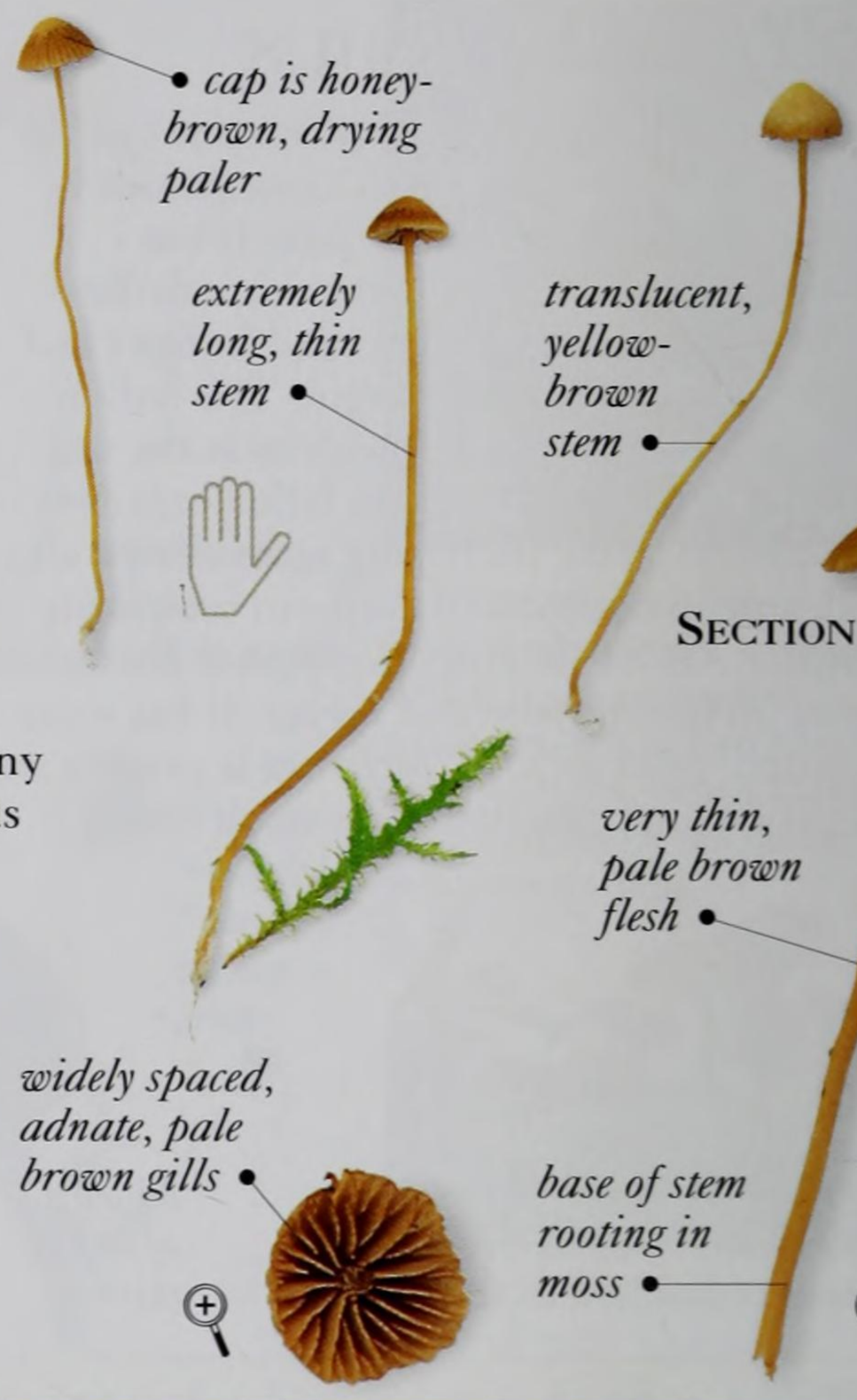
TINY BOG GALERINA

This is a small, slender, honey-brown agaric with a convex, striate cap that dries to paler cream-brown. It has thin, pale brown flesh and gills, and usually smells of yeast. The stem is long, thin, and smooth. Microscopic examination is needed to distinguish it from similar species; its spores are warty and broadly spindle-shaped with a loosening outer wall.

• **OCCURRENCE** On lawns or in damp woods. Widespread, but not reported in North America.

• **SIMILAR SPECIES** *Galerina hypnorum* is differentiated by its spores – the outer wall does not loosen. *G. sphagnorum* grows only in sphagnum moss and has a ring zone on the stem. There are many other *Galerina* species, mostly associated with various mosses or rotten wood.

FRUITING Singly or in small groups on mossy ground.



Dimensions CAP ⟷ 0.3–0.8cm | STEM ↕ 3–5cm ↔ 1–2mm	Spores Ocher-brown	Edibility

Family BOLBITIACEAE	Species *Conocybe lactea*	Season Summer–autumn

WHITE LAWN CONOCYBE

Its elongated cap and ivory coloring enables *Conocybe lactea* to be identified without the aid of a microscope, unlike most *Conocybe* species. The cap is faintly striate and becomes wrinkled with age; the gills are crowded and pale to rust-brown. The surface of the stem is covered in powder and faintly lined. The flesh is thin and fragile.

• **OCCURRENCE** In grass on fertile soil. Disappears by mid-day. Widespread in northern North America, Gulf Coast, California.

• **SIMILAR SPECIES** *C. huijsmanii* has an almost rounded to convex cap. *Bolbitius lacteus* has a more viscid cap and smaller spores, 9.5 x 5.5µm: those of *C. lactea* are 12.5 x 8µm. *Galerina* species (pp.91, 140) typically have gills that are more distant and usually adnate.

FRUITING In troops or a few fruitbodies together.

Dimensions CAP ⟷ 1–1.5cm | STEM ↕ 5–11cm ↔ 1–3cm	Spores Orange-brown	Edibility

Family STROPHARIACEAE	Species *Psilocybe semilanceata*	Season Summer–autumn

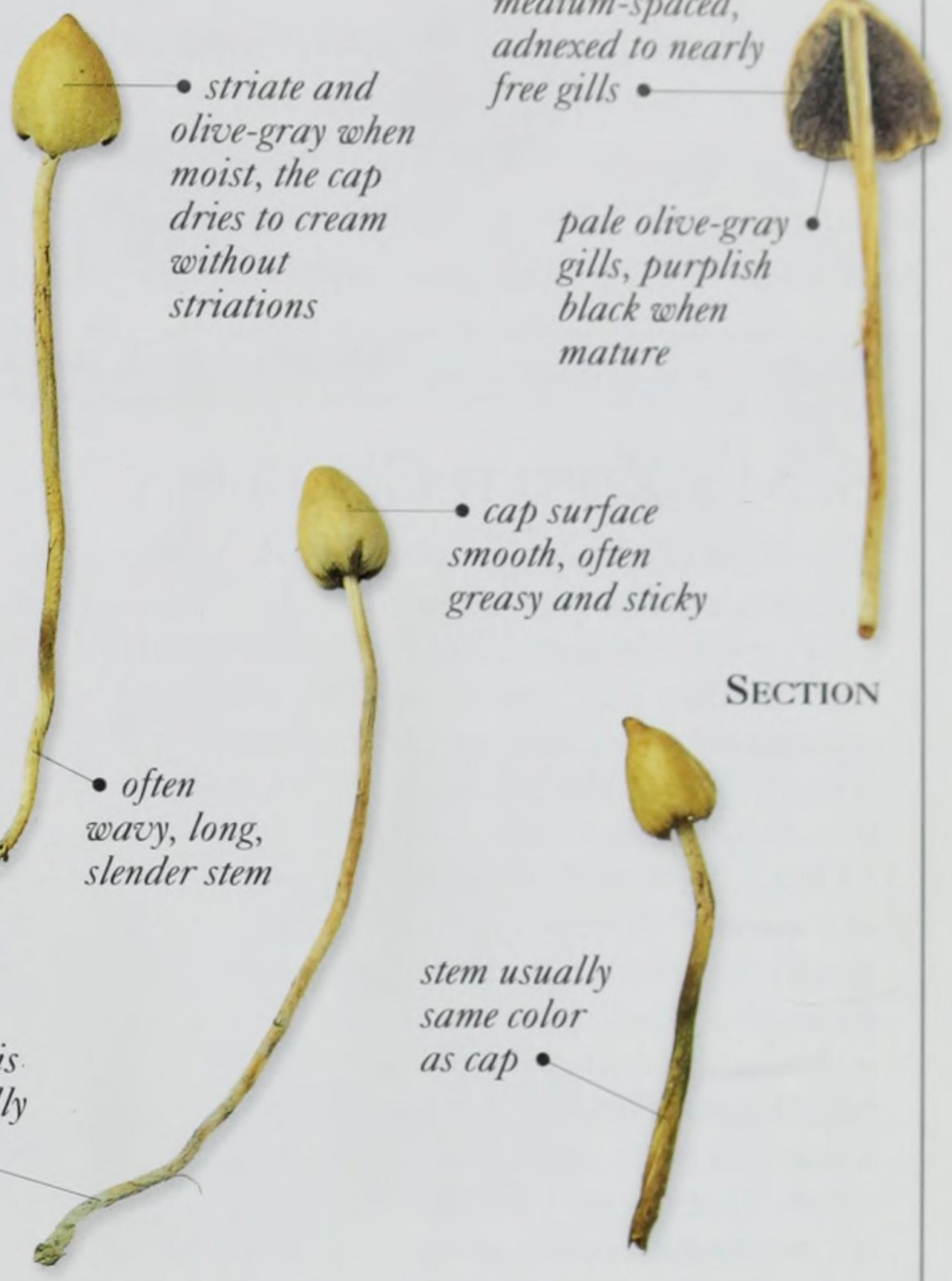
LIBERTY CAP PSILOCYBE

This well-known hallucinogenic agaric has an elegant, conical cap with a distinct pimple on the top; striate and olive-gray in young specimens, it quickly dries to cream without striations. The slender stem is colored like the cap but may have a blue base. The flesh is cream or pale in color and has a musty smell. The symptoms from ingesting this species range from hilarity to incoordination to disorientation, lasting up to four hours.

• **OCCURRENCE** In fertilized grassland, either on heavily grazed or mown areas or hidden deep among clumps of grass.

• **SIMILAR SPECIES** *Psilocybe fimetaria* has a white veil at the margin. It grows in horse manure.

FRUITING Singly or in large troops of fruitbodies.



Dimensions CAP ⊕ 0.5–2cm | STEM ↕ 4–10cm ↔ 2–3mm	Spores Purplish black	Edibility ☠

Family COPRINACEAE	Species *Panaeolina foenisecii*	Season Late spring–autumn

LAWN MOWER'S MUSHROOM

This very common grassland species has a hemispherical to flat, smooth, red-brown cap, and a similarly colored stem with a pale surface bloom. As the cap dries, its colors become zoned, and its surface may break into minute, flattened scales. It has well-spaced, free gills. This species is also placed in the genera *Panaeolus* and *Psathyrella*, but its spores are dark brown; a microscope reveals warty spores, each with a pore. Its flesh has a pleasant, spicy smell but is poisonous.

• **OCCURRENCE** In damp grass. Extremely common in Europe and North America.

• **SIMILAR SPECIES** *P. ater* has black gills and smooth spores.

FRUITING In troops in soil, particularly nutrient-rich soil, in a variety of grassland, including lawns.

Dimensions CAP ⊕ 1–3cm | STEM ↕ 4–6cm ↔ 2–3mm	Spores Dark brown	Edibility ☠

VERY SMALL, CAP NOT SMOOTH

AGARICS IN THIS SUBSECTION, as in the last (pp.132–141), have very small fruitbodies, but are characterized by their very varied, never smooth, cap surfaces. They too are represented in many different families and genera. Their cap surfaces may be fibrous or scaly, or they can be covered with loose grains, as in *Coprinus disseminatus* (p.143), which also has fine hairs.

Family TRICHOLOMATACEAE	Species *Crinipellis stipitaria*	Season Summer–autumn

SCALY ZONED COLLYBIA

The stem of this tough species has a dense covering of stiff, gray to brown hairs. The convex to umbonate, sometimes depressed cap has silky, pale brown hairs, arranged in concentric zones, and has radial streaks. The flesh is off-white and tough; neither the smell nor the taste is noteworthy.

• **OCCURRENCE** In dry grassy areas and on sand dunes. Widespread and locally common in northern temperate zones; widely distributed in northeastern and northcentral US.

• **SIMILAR SPECIES** There are only a few *Crinipellis* species in temperate zones. One tropical species (*C. perniciosa*) causes severe damage to cacao trees.

FRUITING Solitary or in troops on dead plant stems.

Dimensions CAP ⟷ 0.5–1.5cm | STEM ↕ 1.5–3.5cm ↔ 1–2mm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Asterophora parasitica*	Season Autumn

RUSSULA PARASITE

This species has a silky-fibrillose gray cap and stem and well-developed, thick, widely spaced gills with decurrent teeth. It is not considered a worthwhile edible.

• **OCCURRENCE** On rotten fruitbodies of *Russula* and *Lactarius*, typically *R. nigricans* group (p.122), in wooded sites. Widespread in northern temperate zones; rare.

• **SIMILAR SPECIES** Other mushrooms that grow on rotting agarics include *Asterophora lycoperdoides*, which looks similar to a small puffball; *Volvariella surrecta*, on *Clitocybe nebularis* (p.40); and a few small *Collybia* species.

FRUITING In small clusters on fruitbodies.

Dimensions CAP ⟷ 0.5–1.5cm | STEM ↕ 1–3cm ↔ 2–4mm	Spores White	Edibility

Family COPRINACEAE	Species *Coprinus disseminatus*	Season Spring–early autumn

MASSED LESSER INKY CAP

Cream-white when young, the pleated (parachute-like) cap of this species ages gray, but, unlike many *Coprinus* species, produces only a little ink. Fine hairs and grains on the surface are visible through a hand lens. The delicate stem is white, as is the very thin flesh.

• **OCCURRENCE** On and around stumps and dying deciduous trees. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *Psathyrella pygmaea* is similar in appearance and habitat, but its cap surface has neither hairs nor grains and is less pleated.

FRUITING Appears in huge troops near deciduous stumps.

Dimensions CAP ⊕ 0.5–1.5cm | STEM ↕ 1–4cm ↔ 1–2mm	Spores Black	Edibility

Family HYGROPHORACEAE	Species *Hygrocybe miniata*	Season Summer-autumn

FINE-SCALY RED WAX CAP

This mushroom is one of several small *Hygrocybe* species with dry caps densely covered in small scales. They are difficult to tell apart without examining the spores under a microscope: those of this Wax Cap are mostly pear-shaped. The fruitbodies are bright scarlet with a convex, scaly cap and a smooth, shiny stem. The gills are adnate, and the red-orange flesh has an unremarkable smell and taste.

• **OCCURRENCE** In open deciduous or mixed woods, on unimproved grassland. Widespread in northern temperate zones and widely distributed throughout North America.

• **SIMILAR SPECIES** The early fruiting *H. helobia* prefers less acidic conditions, smells of garlic, and has spores of a more regular ellipsoid shape. *H. calciphila* also has more regular-shaped spores and tends to occur on alkaline soil.

FRUITING In troops, mostly on slightly acidic soil, in undisturbed grassland.

Dimensions CAP ⊕ 1–3cm | STEM ↕ 1–6cm ↔ 2–8mm	Spores White	Edibility

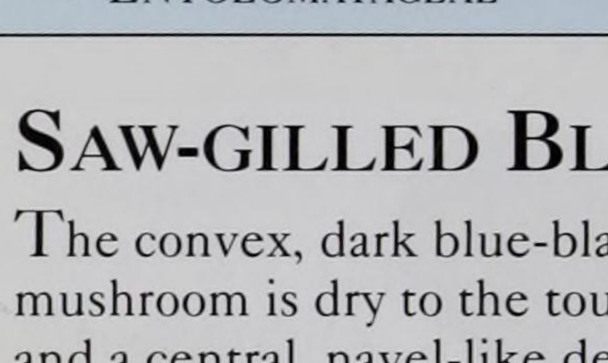
Family ENTOLOMATACEAE	Species *Entoloma serrulatum*	Season Late summer–autumn

SAW-GILLED BLUE-CAP ENTOLOMA

The convex, dark blue-black cap surface of this mushroom is dry to the touch with tiny, erect scales and a central, navel-like depression. The stem is a similar color to the cap. The adnexed, pale blue gills have a serrated, blue-black edge.

• **OCCURRENCE** In grassland, among sparse roadside vegetation, or in open woods. Widespread in Europe and North America.

• **SIMILAR SPECIES** Similar, more-or-less blue *Entoloma* species with colored gill edges include *E. caesiocinctum*, with a browner cap; *E. chalybaeum*, with brown-edged, blue gills that are less serrated; and *E. querquedula*, which has an olive-tinged cap.



FRUITING In small groups on most types of soil.

Dimensions CAP ⊕ 1–2.5cm | STEM ↕ 2–6cm ↔ 2–4mm	Spores Pale pink	Edibility

Family ENTOLOMATACEAE	Species *Entoloma incanum*	Season Summer–early autumn

GREENISH ENTOLOMA

The overall color of this species is green or green-brown, but the flesh discolors to sky-blue when bruised and smells strongly of mice. The cap is convex, with a slightly depressed center, and the slender stem is hollow. It is probably poisonous. Although perhaps the most striking of the smaller *Entoloma* species, its coloring camouflages it well in its grassy habitat.

• **OCCURRENCE** On soil in calcareous grassland or along paths in forests. Widespread but uncommon in Europe and North America.

FRUITING Appears singly or in troops of fruitbodies among herbaceous plants.

Dimensions CAP ⊕ 1–3cm | STEM ↕ 2–6cm ↔ 2–4mm	Spores Pale pink	Edibility

CAP & STEM FUNGI WITH FREE GILLS

This section features the few families of agarics – Amanitaceae, Agaricaceae, and Pluteaceae – in which the species have "free" gills, meaning those that are not attached to the stem. Often the stem can be twisted from the cap flesh without damage to the gills.

WITH VOLVA AND/OR VEIL SCALES ON CAP

THIS GROUP OF AGARICS consists of species from the genera *Amanita* and *Volvariella*. They are comparatively large and fleshy, and distinct remains of the universal veil persist as a saclike structure at the stem base (volva) and/or as loose scales on the cap. Some also have a ring around the stem.

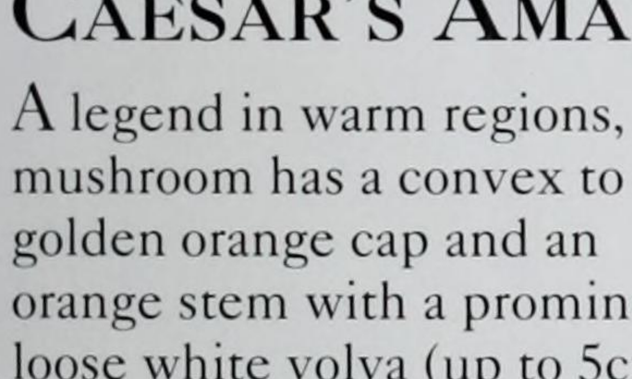
Family AMANITACEAE	Species *Amanita caesarea*	Season Summer–autumn

CAESAR'S AMANITA

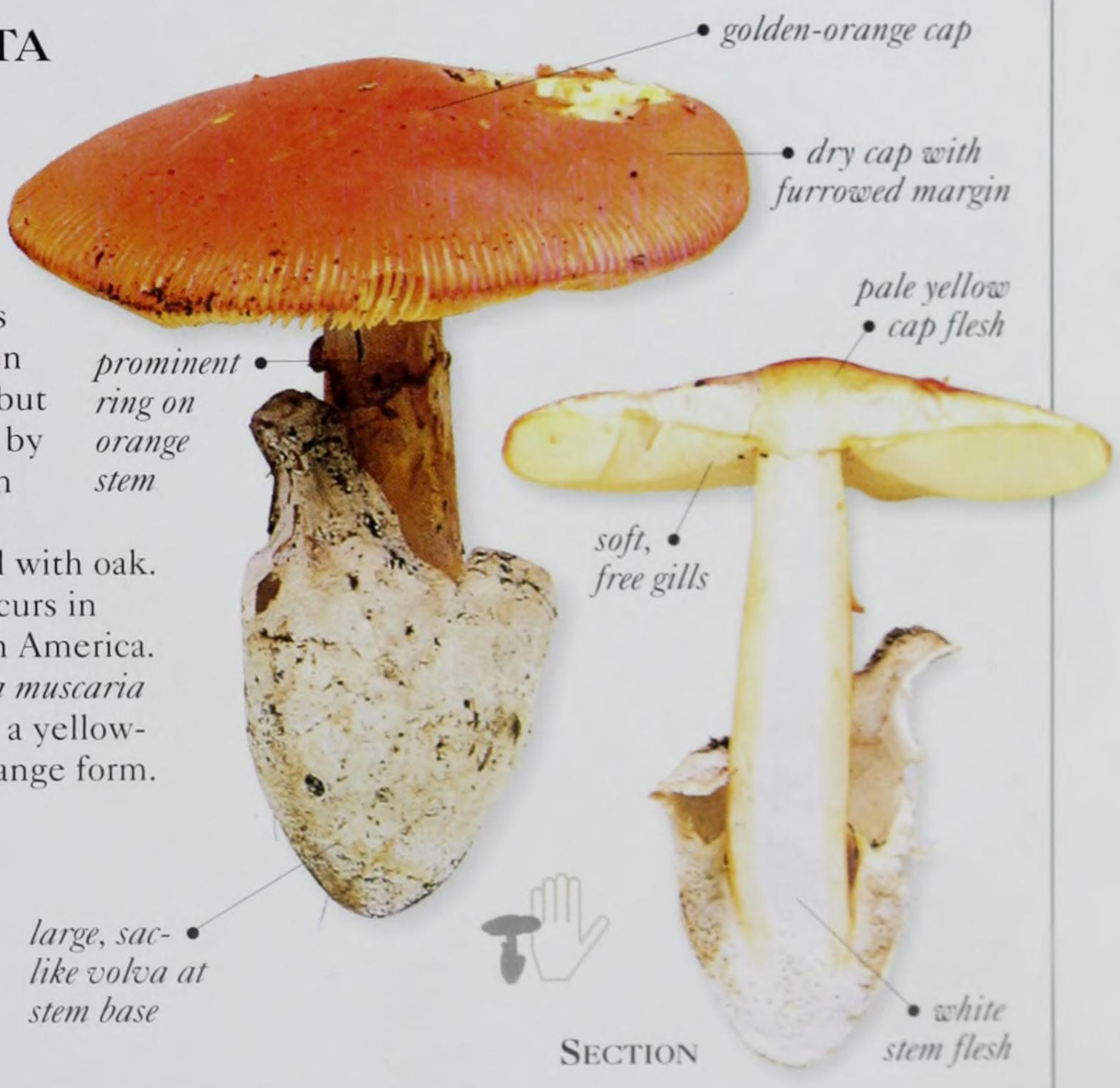
A legend in warm regions, this mushroom has a convex to flat, golden orange cap and an orange stem with a prominent, loose white volva (up to 5cm wide), at the base. The soft gills are crowded and cream to golden yellow. This is a choice edible, but unless it is positively identified by an expert, it should not be eaten (see SIMILAR SPECIES).

• **OCCURRENCE** Mycorrhizal with oak. A complex of similar species occurs in eastern and southwestern North America.

• **SIMILAR SPECIES** *Amanita muscaria* (p.146) has a yellow-orange form.



FRUITING Singly or in troops on sandy soil.



Dimensions CAP ⟷ 8–20cm | STEM ↕ 8–16cm ↔ 2–3cm	Spores Off-white	Edibility 101

Family AMANITACEAE	Species *Amanita muscaria*	Season Summer–autumn

FLY AMANITA

This is the classic fairy-tale toadstool. It has a convex to flattened cap with a smooth or faintly grooved margin and white veil scales on the surface. It occurs in several color forms, including yellow-orange and orange (eastern North America); the brilliant red version (Alaska) is the most familiar. The swollen stem base lacks the loose volva found in other *Amanita* species, such as *A. virosa* (p.150). Although used in minute amounts by native people in Siberia for shamanic purposes, this mushroom is poisonous if eaten in larger quantities.

• OCCURRENCE Mycorrhizal, mostly with birch or spruce, usually on acidic soil.

FRUITING In troops or rings under or near trees.

SECTION

△ *AMANITA MUSCARIA* VAR. *FORMOSA*
This is a yellow- to orange-capped variant, common in eastern North America.

Dimensions CAP ⇹ 6–15cm | STEM ↕ 8–20cm ↔ 1–2.5cm	Spores Off-white	Edibility

Family AMANITACEAE	Species *Amanita rubescens*	Season Summer–autumn

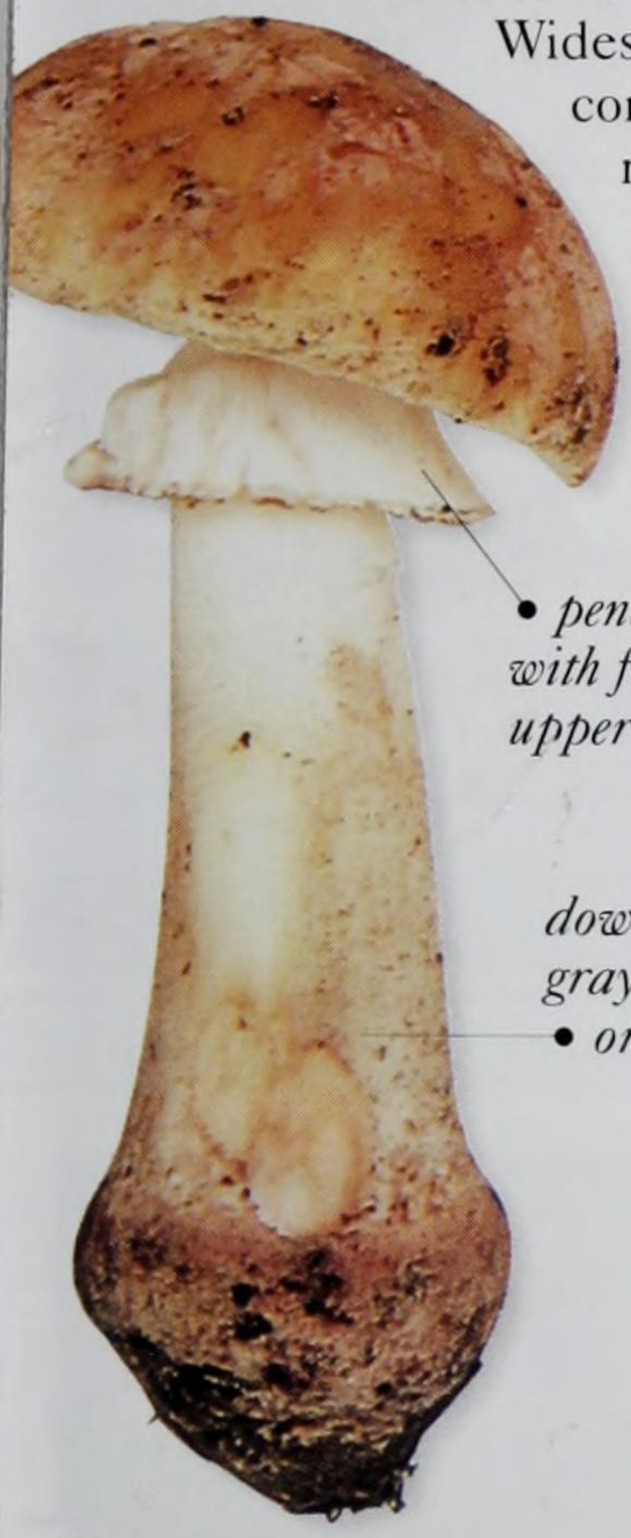
BLUSHING AMANITA

The convex cap of this species is pinkish brown with gray to pink veil patches. The downy, gray, white, or pink stem bears a prominent pendent ring with furrows on its upper surface; the base is swollen and girdled. Small insects lay eggs in the fruitbodies, and the damaged flesh becomes pink tinged – often the best clue to its identity. It is difficult to recognize so should be picked for eating only by experienced foragers.

• **OCCURRENCE** Mycorrhizal with trees, such as beech, and conifers. Widespread and common in northern temperate zones.

gray to pink veil patches on cap surface

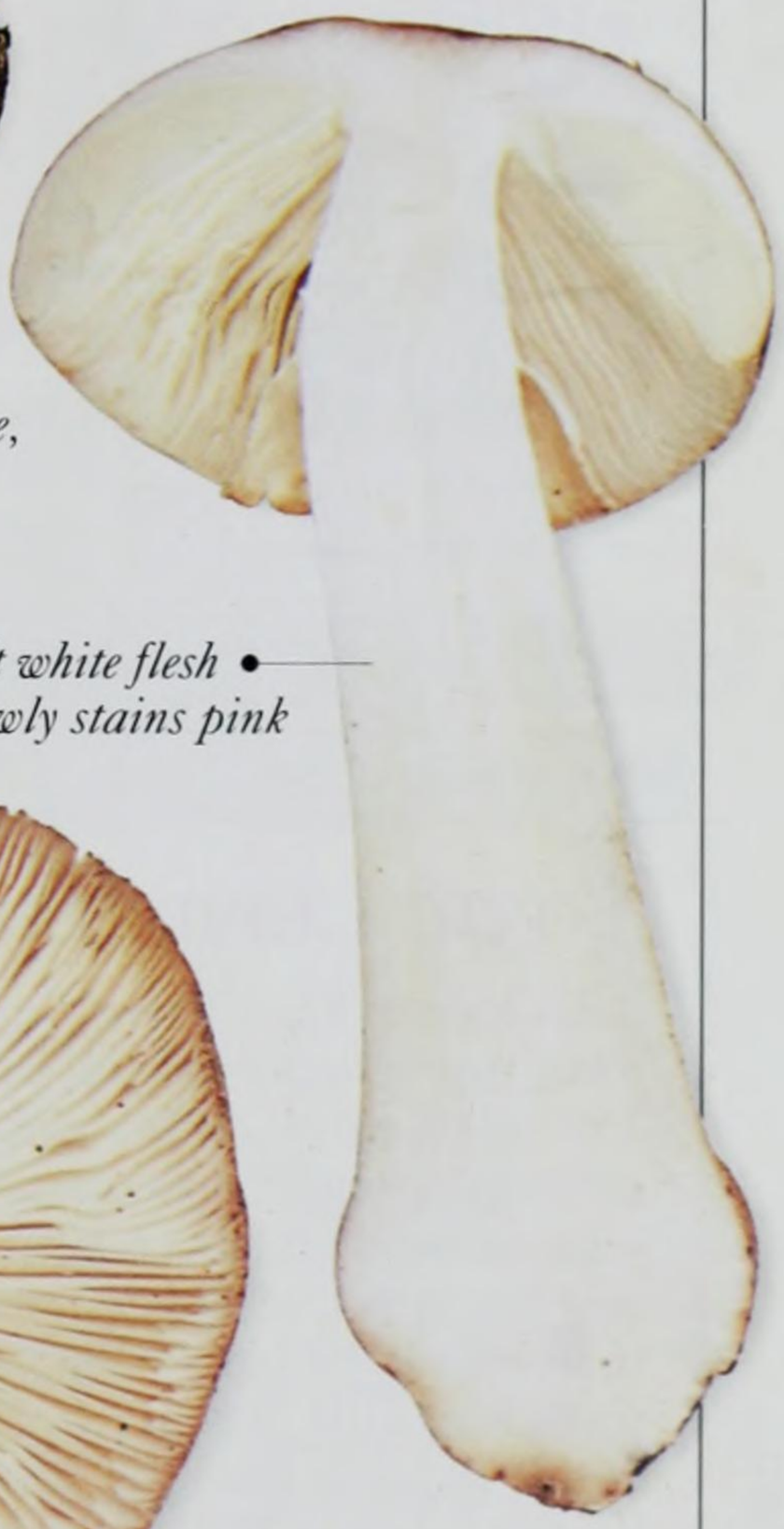
convex cap is pinkish brown



pendent ring, with furrows on upper surface

swollen stem base, to 4cm wide, is girdled with veil remains

SECTION



downy stem is gray, white, or pink

pink tinges appear on damaged areas

soft white flesh slowly stains pink

△ *HYPOMYCES HYALINUS*
A white flask fungus, parasitic on *Amanita rubescens* in eastern North America. It can also occur on *A. virosa* (p.150). ☠

gills are free of stem

crowded, soft, white to off-white gills

FRUITING Singly or in groups, often on acidic soil.

Dimensions CAP ⇹ 6–18cm | STEM ↕ 6–15cm ↔ 1.5–4cm	Spores White	Edibility

Family AMANITACEAE	Species *Amanita spissa*	Season Summer–autumn

STOUT-STALKED AMANITA

This species has a convex, usually dark brown cap with a smooth margin and gray veil patches. The ring on its club-shaped stem has grooves on the upper surface. It smells faintly of canola oil. Although this mushroom is edible after cooking, it is not recommended; see SIMILAR SPECIES. *A. excelsa*, considered by some to be a separate species, is paler with a rooting stem and no smell.

• **OCCURRENCE** Typically with beech or spruce in woods. Widespread in northern temperate Europe, Asia, and eastern North America.

• **SIMILAR SPECIES** Poisonous *A. pantherina* (p.149). *A. rubescens* (p.147) has pink tinges.

FRUITING Appears singly or a few together.

Dimensions CAP ⇔ 7–15cm | STEM ↕ 8–14cm ↔ 2–4cm	Spores White	Edibility

Family AMANITACEAE	Species *Amanita smithiana*	Season Autumn

TOXIC LEPIDELLA AMANITA

This species has a convex to flat white cap with conical veil patches. The veil is also visible in shreds around the smooth cap margin. The scaly white stem has a ragged ring and gets larger toward the rooting base, where the basal bulb may be up to 5cm wide. The thick, white, faintly pungent flesh can cause kidney failure or liver disease.

• **OCCURRENCE** Mycorrhizal with conifers. Widespread and common in the Pacific Northwest.

• **SIMILAR SPECIES** *Tricholoma magnivelare* (p.81) has a spicy smell and a rooting stem. *Amanita virosa* complex (p.150), with a smooth cap and saclike volva, is easily distinguished.

FRUITING Singly or in scattered groups under conifers in woods.

Dimensions CAP ⇔ 5–12.5cm | STEM ↕ 10–20cm ↔ 1–3cm	Spores White	Edibility

Family AMANITACEAE	Species *Amanita pantherina*	Season Summer–autumn

PANTHER AMANITA

This dangerous hallucinogen has variable coloring, which complicates identification. The flattened cap is normally pale brown, with many small veil scales on the surface and fine radial marginal grooves. Identification features are the bulblike stem base, with its distinct rim, and a stem ring with no grooves on its upper side. The white flesh is poisonous.

• **OCCURRENCE** Mycorrhizal with conifers and a range of deciduous trees, mostly on alkaline soil, in woods and parks. Widespread and common in northern temperate zones.

FRUITING Singly or in small groups beneath trees.

radial grooves at margin

dry, dull brown cap with white veil scales

pointed bulb at base of stem

crowded, free, soft white gills

pendent ring without grooves

girdles may appear on white stem above bulb rim

stem base to 3cm wide

Dimensions CAP ⊕ 5–12cm | STEM ↕ 6–12cm ↔ 0.5–1.5cm	Spores Off-white	Edibility ☠

Family AMANITACEAE	Species *Amanita gemmata*	Season Summer–autumn

GEMMED AMANITA

This species has a flattened, ocher-yellow cap with a furrowed margin and white veil patches on the surface. Off-white to pale yellow, the solid stem has an indistinct ring zone left by the short-lived ring, veil girdles, and a narrow-rimmed basal bulb, up to 2cm wide. A wide range of forms occur in North America, making correct identification difficult.

• **OCCURRENCE** Mycorrhizal with conifers, or in deciduous forests, on sandy soil. As a complex, widespread but local in northern temperate zones.

• **SIMILAR SPECIES**
Amanita citrina (p.150) has more persistent scales on the cap and smells of raw potatoes.

soft, crowded gills

free white gills

furrows at margin of ocher-yellow cap

narrow rim on bulb

SECTION

soft flesh is white, becoming yellow near surface

FRUITING Appears in small groups of fruitbodies.

Dimensions CAP ⊕ 3–10cm | STEM ↕ 5–10cm ↔ 0.5–1.5cm	Spores White	Edibility ☠

Family AMANITACEAE	Species *Amanita virosa*	Season Summer–autumn

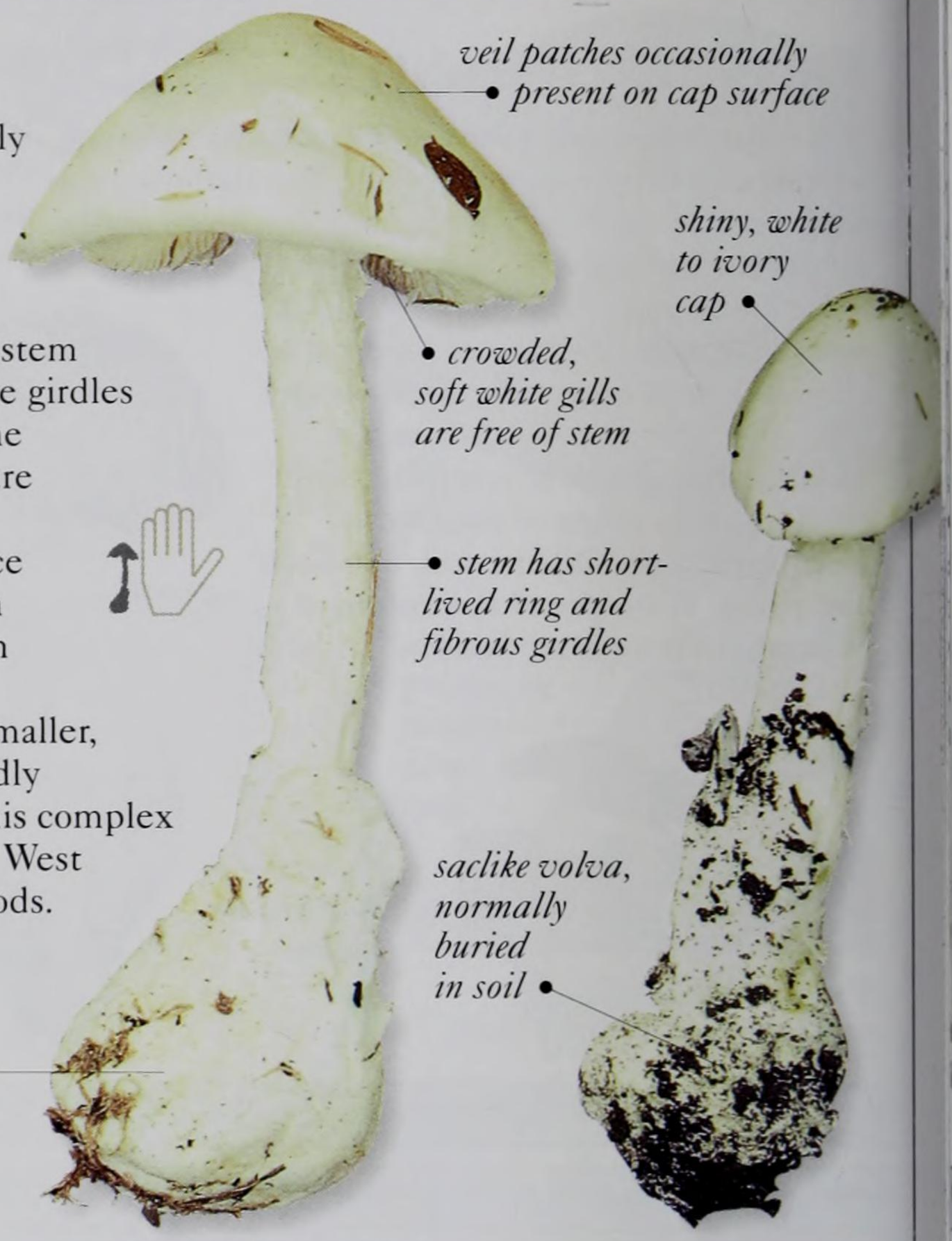
DESTROYING ANGEL

The saclike volva of this species is normally buried in the soil, so specimens should be dug up carefully for correct identification. The shiny, white to ivory cap usually lacks veil patches and is bell-shaped or conical. Unlike many *Amanita* species, the stem ring is indistinct and the stem tends to have girdles of fine fibers. It is deadly poisonous; anyone picking edible mushrooms should make sure they are familiar with this species.

• **OCCURRENCE** Mycorrhizal with spruce in northern Europe but with oak in eastern and western North America. Widespread in northern temperate zones.

• **SIMILAR SPECIES** *A. bisporigera* is a smaller, more slender, two-spored, but equally deadly mushroom of eastern oak woods. Also in this complex is *A. ocrata*, common in West Coast oak woods.

FRUITING Appears singly or in groups on poor soil.



Dimensions CAP ⊕ 6–11cm | STEM ↕ 10–20cm ↔ 1–2cm	Spores White	Edibility ☠

Family AMANITACEAE	Species *Amanita citrina*	Season Late summer–autumn

CITRON AMANITA

Two good identification features of this species are its lemon-yellow or white coloring and the swollen, rounded bulb, up to 3cm wide and with a distinct rim at the base of its stem. The cap is convex, with a smooth margin and often veil remnants; the stem bears a large pendent ring toward its top. The white flesh has a distinctive and strong smell of raw potatoes.

• **OCCURRENCE** Mycorrhizal with conifers and deciduous trees, mostly on acidic soil. Widespread and common in northern temperate zones.

SECTION

FRUITING Appears singly or in troops on acidic soil.

Dimensions CAP ⊕ 5–10cm | STEM ↕ 6–13cm ↔ 0.8–1.5cm	Spores Off-white	Edibility 🍽

Family AMANITACEAE	Species *Amanita phalloides*	Season Late summer–autumn

DEATH CAP AMANITA

This species has a convex to flattened, green to gray cap with a smooth margin but a fibrous surface. The stem may be similarly colored or off-white with a prominent white volva, 3–5cm wide. Young specimens are relatively easy to identify by their green tinges, free gills, and prominent white volvas. There is usually a stem ring, but it may be absent. Older specimens may have gray caps (see SIMILAR SPECIES). This is a deadly poisonous mushroom.

• **OCCURRENCE** Mycorrhizal with American oaks, pines, and Norway spruce, on rich soil. Widespread and common in parts of Europe and northern North America.

• **SIMILAR SPECIES** Some *Volvariella* species (pp.154–55) look similar to older specimens of *Amanita phalloides*. They are distinguished by a pale pink spore deposit and lack of a stem ring. *A. virosa* (p.150) is completely white.

FRUITING Singly or in troops of fruitbodies.

Dimensions CAP ⇹ 8–15cm | STEM ↕ 8–16cm ↔ 1–2.5cm	Spores Off-white	Edibility ☠

Family AMANITACEAE	Species *Amanita porphyria*	Season Summer–autumn

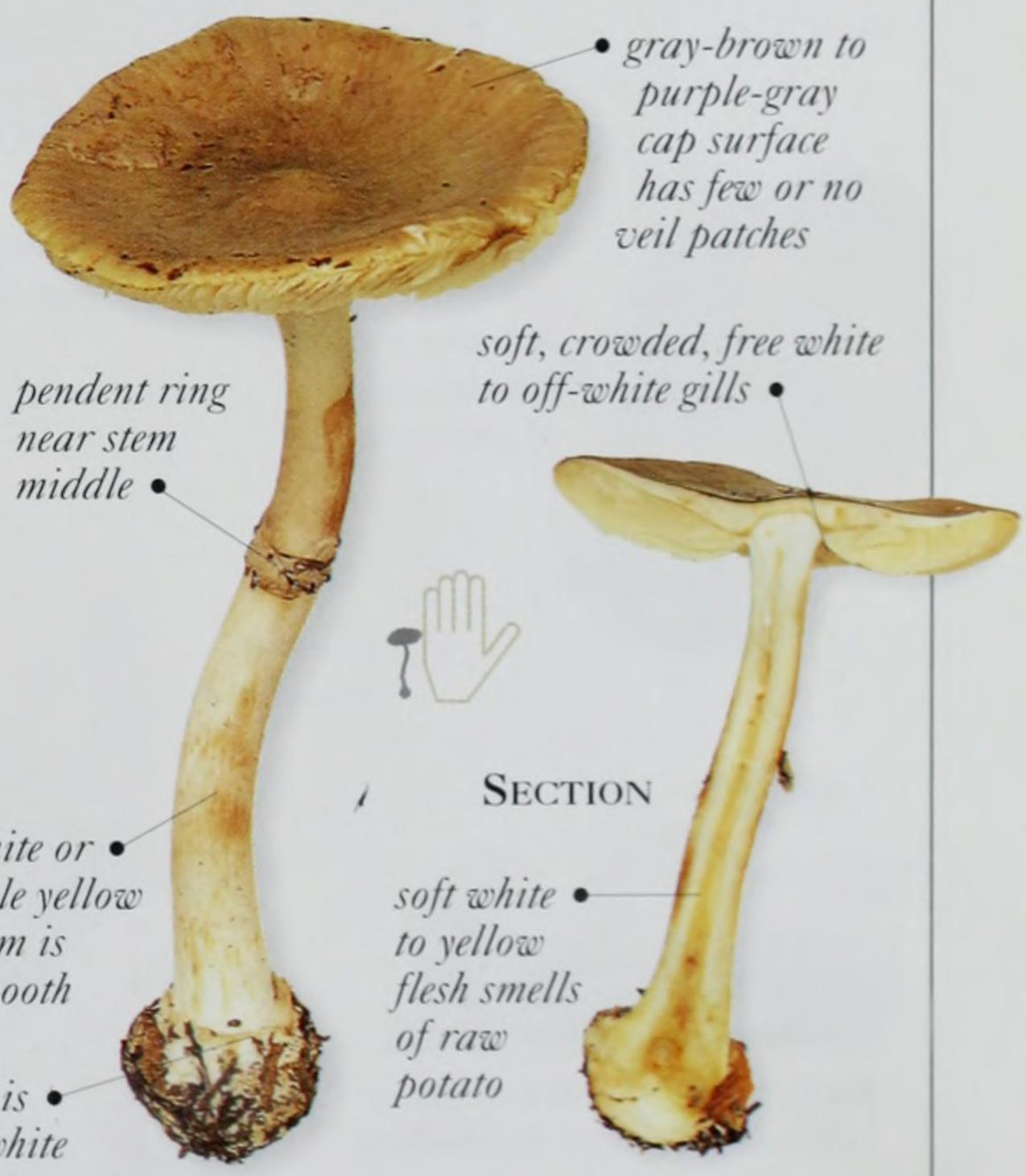
PURPLE-BROWN AMANITA

Named after the color of its convex to umbonate cap, which is porphyrous (purplish brown), the Purple-brown Amanita has a pendent gray ring around its stem, which is bulbous at the base, with an off-white or pale gray volva, to 2.5cm wide. It smells like raw, peeled potatoes and is slightly poisonous. It could easily be confused with its deadly relatives so should be avoided.

• **OCCURRENCE** Mycorrhizal with conifers on acidic soil. Widespread in northern temperate Europe, Asia, and northern North America.

• **SIMILAR SPECIES** *A. citrina* (p.150) has a similar smell, but its habitat and coloring are different. *A. spissa* (p.148) has similar coloring but lacks the smell.

FRUITING Appears singly or in small groups.



Dimensions CAP ⇹ 5–9cm | STEM ↕ 8–13cm ↔ 1–2cm	Spores White	Edibility 🍽

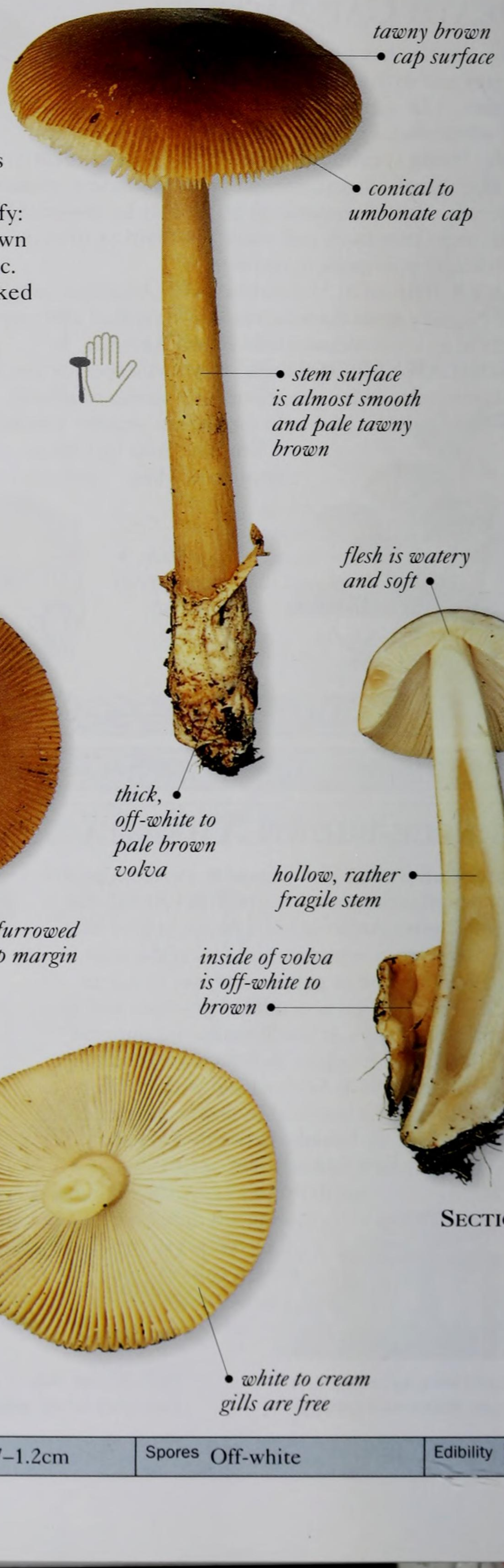
Family AMANITACEAE	Species *Amanita fulva*	Season Summer–autumn

TAWNY GRISETTE

This species has a conical to umbonate, smooth, tawny brown cap and a downy and slightly fibrillose stem in a similar color. A furrowed cap margin and the absence of a stem ring or girdles indicate that this species belongs to the subgenus *Amanitopsis*. Many *Amanitopsis* species can be difficult to identify: the color of the volva – off-white to pale brown in this species – is an important characteristic. Although edible, *Amanita fulva* must be cooked thoroughly before being eaten. The soft, watery flesh is off-white. It turns chocolate-brown in contact with phenol.

• **OCCURRENCE** Mycorrhizal with birch trees in wooded areas. Widespread in northern temperate zones, especially common in eastern North America.

• **SIMILAR SPECIES** *A. crocea* and *A. vaginata* (both p.153).



FRUITING Appears singly or in small groups of fruitbodies.

SECTION

Dimensions CAP ⟷ 3–8cm | STEM ↕ 7–15cm ↔ 0.7–1.2cm	Spores Off-white	Edibility

Family AMANITACEAE	Species *Amanita crocea*	Season Early summer–autumn

ORANGE GRISETTE

This striking species has a convex to umbonate, shiny orange cap, which is smooth with a furrowed margin. The stem, which is without a ring, has thin orange girdles and a prominent, thick white volva. Like *Amanita fulva* (p.152), it belongs to the subgenus *Amanitopsis*. Although both species are often found near birch, *A. crocea* prefers much richer soil. It is edible, with soft, off-white flesh, but must be thoroughly cooked before eating. If harvested for eating, the fruitbodies should be used as soon as possible since they do not keep well.

• **OCCURRENCE** Mycorrhizal with birch trees, and possibly also spruce, beech, and oak, on fairly rich soil in lowland areas and at higher altitudes, near the tree line. Widespread in Europe and North America.

• **SIMILAR SPECIES**
A. fulva (p.152) has off-white flesh turning chocolate-brown in contact with phenol, whereas the flesh of *A. crocea* turns dark wine-red. *A. vaginata* (inset, below).

SECTION

△ *AMANITA VAGINATA*
This gray to near white species has a convex to umbonate cap, furrowed at the margin. The stem has a mealy surface and a prominent volva. It occurs mainly under deciduous trees on rich soil. Beware of the deadly look-alike *Amanita virosa* (p.150). |◎|

FRUITING Singly or in small groups under birch.

Dimensions CAP ⊕ 6–12cm | STEM ↕ 10–20cm ↔ 1–2cm	Spores Off-white	Edibility |◎|

Family PLUTEACEAE	Species *Volvariella bombycina*	Season Summer–autumn

TREE VOLVARIELLA

An easy species to identify, but not so easy to find; it is rare and may be high up in trees. It has a very large, conical to umbonate, white to pale yellow cap, covered in silky fibers, and a pronounced volva at the base of the white to yellowish cream stem. It has a pleasant smell and is edible, but because of its saclike volva it must be identified accurately.

• **OCCURRENCE**
On standing dead trees, on stored wood, or in buildings. Widespread in northern temperate zones, but mostly local; also farther south.

• **SIMILAR SPECIES** The Deadly Amanitas also have a saclike volva but grow on the ground.

FRUITING Singly or in clusters, often on elm.

Dimensions CAP ⇔ 10–25cm | STEM ↕ 8–20cm ↔ 1–2.5cm	Spores Pale pink	Edibility

Family PLUTEACEAE	Species *Volvariella gloiocephala*	Season Summer–autumn

FIELD VOLVARIELLA

This is the largest of all the soil-growing *Volvariella* species; it is distinguished by a smooth, sticky, conical or umbonate cap that ranges between white and mouse-gray in color. The stem is off-white to dingy gray-yellow with a white to pale gray volva at the base. The off-white flesh tastes like cucumber and smells of radishes. Once gathered, the fruitbodies deteriorate quickly. It is a synonym of *V. speciosa*.

• **OCCURRENCE** On disturbed, nutrient-rich soil, compost beds, bark mulches, or under haystacks. Widespread and common in northern temperate zones, extending farther south.

• **SIMILAR SPECIES** A close relative, *V. volvacea*, is commercially grown in parts of southeast Asia. It has a shorter stem and a dark gray volva. The caps of young specimens are darker gray-brown.

SECTION

FRUITING In troops and singly, often on straw.

Dimensions CAP ⇔ 6–14cm | STEM ↕ 10–25cm ↔ 0.7–1.5cm	Spores Pale pink	Edibility

WITH STEM RING OR RING ZONE

THE SPECIES in this subsection have free gills (see p.145) and the remains of the partial veil clearly visible on the stem, as either a ring or a ring zone. The ring varies from large to small and may be persistent or short-lived. Where there is no ring, the area where it would be – the ring zone – is marked by threads or darker marking. Most species featured have white or dark brown to black spore deposits and belong to the family Agaricaceae.

Family AGARICACEAE	Species *Agaricus sylvicola*	Season Summer–autumn

WOODS AGARICUS

This species is a woodland form of *Agaricus arvensis* (p.157); its stem is more slender, and the bulb is usually flat. The cap is convex to expanded, then flat, with a yellow- or off-white to orange-yellow or pale ocher smooth surface. It smells of almonds or anise, and its white flesh very slowly stains yellow. A choice edible, it must be identified accurately because the Deadly Amanitas also occur on the ground in woods, have membranous stem rings, white spore prints, and saclike volvas.

• OCCURRENCE On rich forest soil mixed with debris, under trees. Widespread and common throughout northern temperate zones.

more or less smooth cap

veil threads at cap margin

ocher-yellow stain appears slowly on white flesh

white edge on gills

free gills

upper side of ring stained by deposited spores

long, slender stem

SECTION

crowded gills are pale pink then chocolate-brown

large, pendent double stem ring with scaly underside

basal swelling on stem, to 3cm wide

FRUITING A few together or occasionally in rings.

Dimensions CAP ⇹ 6–12cm | STEM ↕ 8–12cm ↔ 1–2cm	Spores Chocolate-brown	Edibility

Family AGARICACEAE	Species *Agaricus arvensis*	Season Summer–autumn

HORSE AGARICUS

This species has a rounded to convex cap with a smooth, yellow- to off-white surface that very slowly stains orange-yellow to ocher, particularly where bruised. The yellowish stem, which thickens toward the base, has a pendent ring with a wheel-like pattern on its underside. The thick, firm white flesh also stains very slowly. It smells strongly of almonds and is edible but contains high levels of cadmium.

• **OCCURRENCE** Often found in horse-grazed pasture and on lawns and in parks, near spruce. Widespread and common in northern temperate zones; throughout western North America.

• **SIMILAR SPECIES** There are several similar species. *Agaricus augustus* (p.158). *A. macrosporus* is very fleshy, with scaly stem girdles. *A. sylvicola* (p.156) is a woodland form. *A. xanthoderma* (p.159).

SECTION

FRUITING Mostly appears in fairy rings in grass.

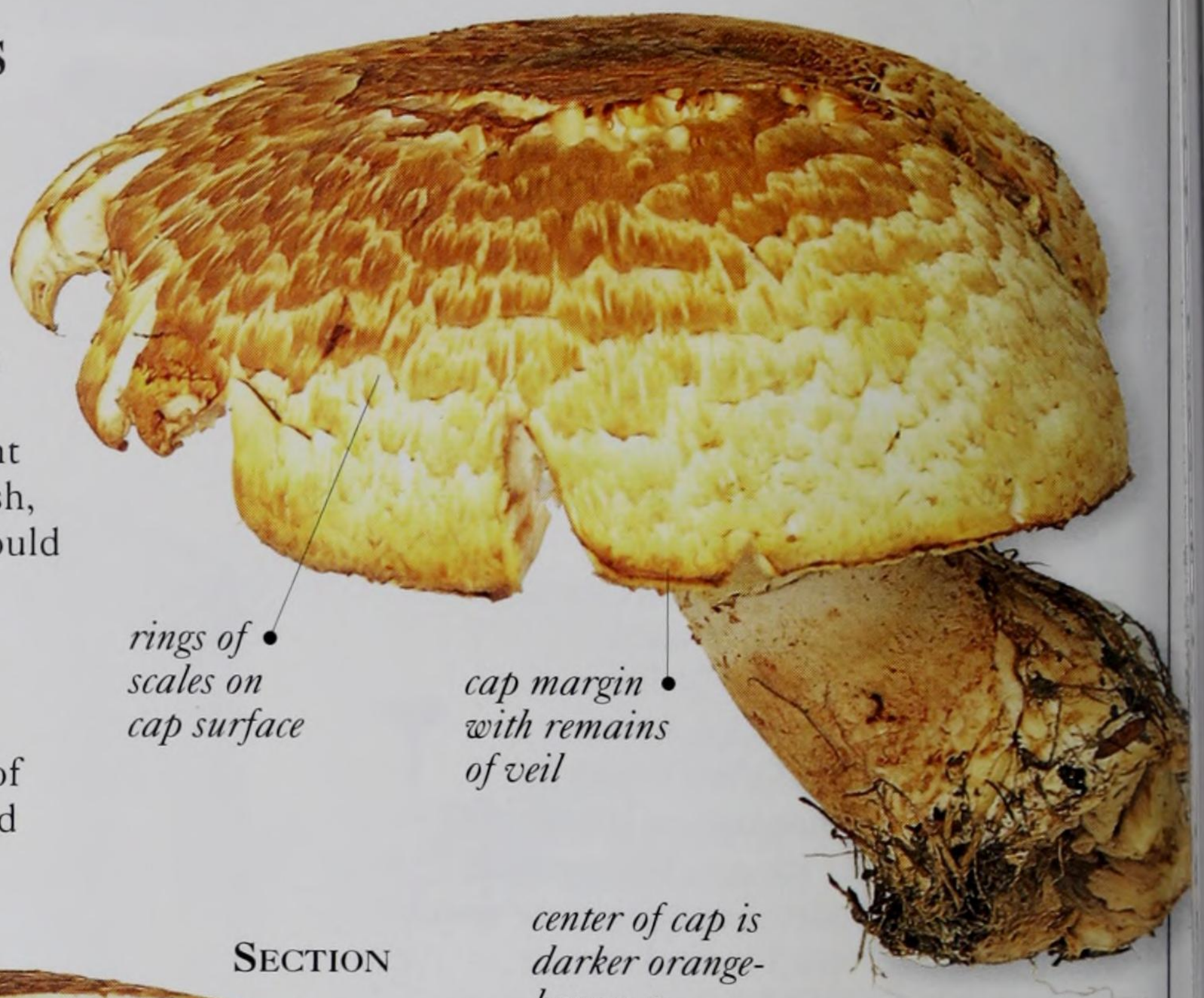
Dimensions CAP ⟷ 7–15cm | STEM ↕ 7–15cm ↔ 1–3cm	Spores Chocolate-brown	Edibility

Family AGARICACEAE	Species *Agaricus augustus*	Season Autumn

PRINCE AGARICUS

Orange-brown scales on the surface of both cap and stem, together with yellow-staining flesh that smells of almonds, identify this species. The scales are in a concentric pattern on the convex to expanded cap, and the stem has a large, pendent ring. With its firm, abundant flesh, it makes a choice edible, but should only be eaten in moderation because, like some other edible *Agaricus* species, it concentrates heavy metals like cadmium.

• **OCCURRENCE** In all types of woods and parks, on rich soil, and on garden compost. Widely distributed in North America.



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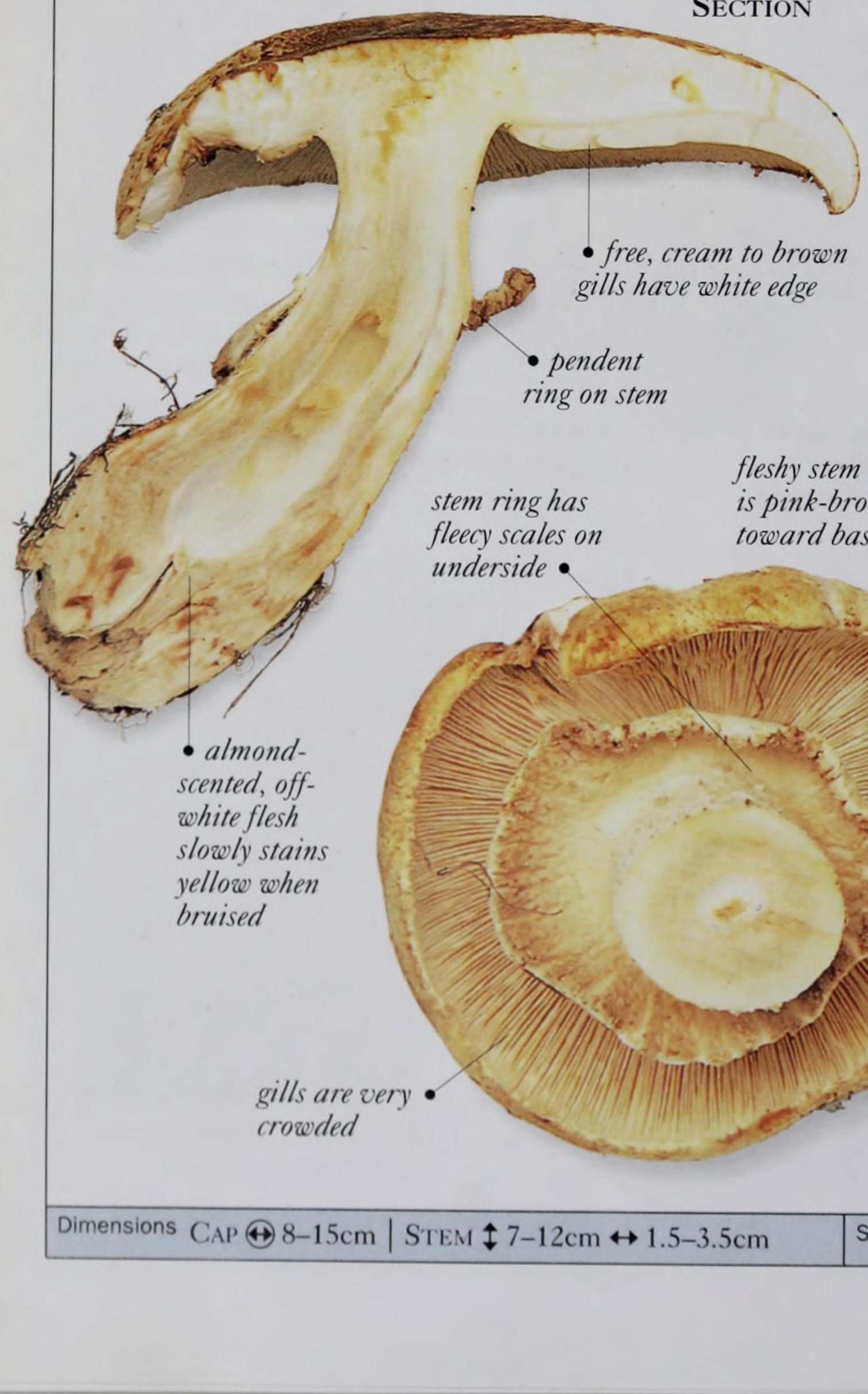


FRUITING A few together or in large troops on soil.

Dimensions CAP ⟷ 8–15cm | STEM ↕ 7–12cm ↔ 1.5–3.5cm	Spores Chocolate-brown	Edibility

Family AGARICACEAE	Species *Agaricus xanthoderma*	Season Summer–autumn

TOXIC YELLOWING AGARICUS

Despite having a yellow-staining surface and flesh, this poisonous mushroom appears whiter, almost chalk-white in comparison with the other, slower-staining *Agaricus* species. Its most obvious characteristics are its stem base, which is very bright yellow at the tip when cut lengthwise, and its smell, which is very similar to that of ink.

• **OCCURRENCE** On bare soil or in grass in parks, cemeteries, and similar places. Widespread throughout northern temperate zones and elsewhere.

• **SIMILAR SPECIES** *A. arvensis* (p.157) and *A. sylvicola* (p.156) have a distinctive almond smell. Both are slower to stain yellow and are edible. *A. praeclaresquamosus* (p.160) is darker in color and poisonous.

FRUITING Often in large troops or fairy rings.

△ *AGARICUS CALIFORNICUS*
This species from California has a convex white to pale brown cap with a scaly surface, a pendent ring on the white stem, and white gills that turn bright pink then dark brown. Most parts stain yellow. ☠

△ *AGARICUS HONDENSIS*
This is a foul-smelling woodland species from the Pacific coast of North America. Its cap is white to pinkish gray, aging darker, and there is a flaring to pendent stem ring. The gills are grayish pink. ☠

Dimensions CAP ⟷ 5–13cm | STEM ↕ 5–10cm ↔ 1–2cm	Spores Chocolate-brown	Edibility ☠

Family AGARICACEAE	Species *Agaricus praeclaresquamosus*	Season Late summer–autumn

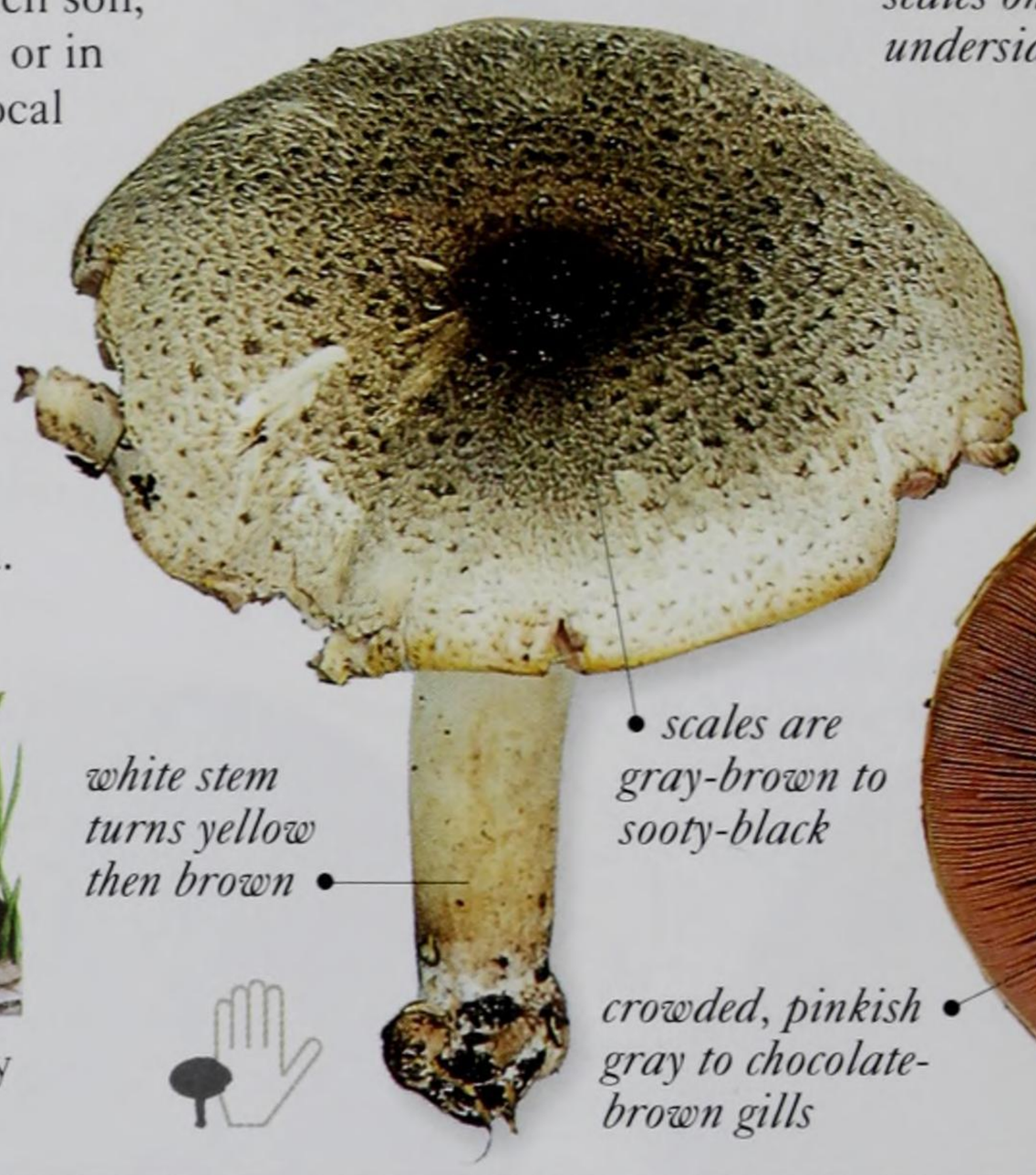
TOXIC SCALY AGARICUS

The convex to flattened cap of this unpleasant-smelling species has pointed, gray-brown to sooty black scales. The stem is off-white, staining yellow then brown, and the white flesh quickly turns to yellow when cut. An ally of *A. xanthoderma* (p.159), it has similar poisonous properties and can cause severe gastric upsets.

• OCCURRENCE On rich soil, usually in alkaline woods or in parks. Widespread, but local to rare, in northern temperate zones.

• SIMILAR SPECIES *A. meleagris* is the western North American equivalent. *A. placomyces* is common in eastern North America. Both are poisonous.

FRUITING Appears in fairy rings or large troops.



SECTION

Dimensions CAP ⟷ 5–14cm | STEM ↕ 6–10cm ↔ 1–1.5cm	Spores Chocolate-brown	Edibility ☠

Family AGARICACEAE	Species *Agaricus campestris*	Season Summer–autumn

MEADOW AGARICUS

A familiar edible mushroom with a faintly reddening white fruitbody. The cap is convex to flat with a smooth to fibrillose surface; it may be pinkish gray in older specimens. The gills are pink, then chocolate-brown, unlike most other *Agaricus* species, which have paler gill edges. The small stem ring is single and smooth. The firm white flesh smells and tastes musty.

• OCCURRENCE Almost exclusively found in the open – often in pastureland and in grassy areas in urban parks. Widespread and common in northern temperate zones.

SECTION

FRUITING Appears in large groups or fairy rings.

Dimensions CAP ⟷ 4–10cm | STEM ↕ 3–7cm ↔ 0.8–1.5cm	Spores Chocolate-brown	Edibility 🍽

Family AGARICACEAE	Species *Agaricus bitorquis*	Season Summer–autumn

SPRING AGARICUS

This species has several distinguishing features: a prominent double stem ring, which is sheathed and upturned; its acidic-smelling, firm flesh slowly turns pink; it has a squared cap with an inrolled margin. Although it is edible, it is safer collected in parks than along roadsides.

• **OCCURRENCE** Mostly found in urban areas, in hard or packed soil, or in schoolyards. Widespread and common in Europe and North America.

• **SIMILAR SPECIES** *Stropharia rugoso-annulata* (p.89) has gills that are attached to the stem and a purple-black spore print;

FRUITING A few together. They can be found emerging from hard soil or tarmac.

Dimensions CAP ⟷ 5–12cm | STEM ↕ 4–8cm ↔ 1–3.5cm	Spores Chocolate-brown	Edibility

Family AGARICACEAE	Species *Agaricus bisporus*	Season Late summer–autumn

CULTIVATED AGARICUS

This species is perhaps the best known of all edible mushrooms. It is cultivated on a large scale; only species like *Volvariella volvacea* (Paddy Straw Mushroom), *Pleurotus ostreatus* (Common Oyster Mushroom, p.178), and *Lentinula edodes* (Shiitake) compete in commercial importance. Its convex cap varies from white to dark brown, and its stem has an upturned ring. Its flesh stains very slightly red.

• **OCCURRENCE** By roadsides, in cemeteries, and other sites with rich, disturbed soil. Widespread throughout northern temperate zones.

SECTION

FRUITING Appears in troops and fairy rings.

Dimensions CAP ⟷ 5–10cm | STEM ↕ 3–6cm ↔ 1–2cm	Spores Chocolate-brown	Edibility

Family AGARICACEAE	Species *Agaricus bernardii*	Season Summer–autumn

SALT-LOVING AGARICUS

This very fleshy mushroom tolerates soil that is rich in salt. It has a flattened or convex, white to gray-white cap, the surface of which often cracks into a scaly pattern. The thickset stem has a sheathing ring with a narrow, upturned rim. The Salt-loving Agaricus has firm, white, foul-smelling flesh that slowly turns pink with age. It is edible but is not worth eating.

• **OCCURRENCE** In the salt-spray zones of coastal areas or along roads that are salted during the winter. Widespread on east and west coasts of North America and in Europe.

• **SIMILAR SPECIES** *Agaricus bitorquis* (p.161) is found in similar sites.

white flesh turns pink when bruised

SECTION

convex or flattened cap with dry surface

extremely fleshy, white to gray-white cap

sheathing stem ring has narrow, upturned rim

cap may have scaly pattern

smooth cap margin

cap margin is inrolled

pink to chocolate-brown gills are crowded and free

FRUITING Appears in troops of fruitbodies.

Dimensions CAP ⇔ 7–15cm | STEM ↕ 5–10cm ↔ 2–4cm	Spores Chocolate-brown	Edibility

Family AGARICACEAE	Species *Agaricus sylvaticus*	Season Summer–autumn

RED-STAINING AGARICUS

The convex to umbonate cap of this species is covered with fine brown fibers. The stem, with its pendent ring, may have a fibrous-scaly surface. Also known as the Pinewood Mushroom, Wood Mushroom, and Scaly Wood Mushroom, this choice edible has pleasant-smelling, off-white flesh that stains deep red, mostly after bruising, although the color reaction is less marked than in some of its relatives.

• **OCCURRENCE** On conifer debris in forests, parks, and damp woods. Widespread in northern temperate zones.

• **SIMILAR SPECIES** *Agaricus langei*, also a good edible, is more fleshy and stains a deeper red. *A. phaeolepidotus* stains yellow and is poisonous.

FRUITING Appears in troops or fairy rings.

Dimensions CAP ⊕ 5–10cm | STEM ↕ 5–10cm ↔ 0.5–1.5cm	Spores Chocolate-brown	Edibility

Family AGARICACEAE	Species *Agaricus porphyrizon*	Season Throughout autumn

PURPLISH YELLOW AGARICUS

This species is an unusually sturdy, fleshy member of a group of mostly small *Agaricus* species, called section *Minores*, that all have an almond smell, yellow-staining flesh, and, often, purple cap colors. The cap is convex, with a covering of fine, purple-lilac fibers on a paler background, and the stem is white with a bulbous yellow to orange base and a fragile, narrow stem ring. The gills are gray-pink to purple-black. It has edible white flesh that slowly stains yellow.

• **OCCURRENCE** On soil and leaf litter in deciduous woods, but also on conifer debris and in gardens. Widespread but local in Europe; not reported in North America.

FRUITING Appears singly or a few fruitbodies together on rich soil among leaf litter.

Dimensions CAP ⊕ 5–8cm | STEM ↕ 4–6cm ↔ 0.7–1cm	Spores Chocolate-brown	Edibility

Family AGARICACEAE	Species *Leucoagaricus leucothites*	Season Late summer–autumn

SMOOTH LEPIOTA

The convex cap of this white species has a smooth, dry surface. The stem has a thin ring, which may be loose, and a club-shaped base. The white flesh smells pleasant but is poisonous. Subtle color differences have led some experts to divide *Leucoagaricus leucothites* into a small group of separate species. This complex is known in the US as *L. naucinoides*.

• **OCCURRENCE** In grass along roadsides and in parks, gardens, and sand dunes. Widespread in Europe and North America.

• **SIMILAR SPECIES** Several *Agaricus* species are similar, but their spore deposits and mature gills are chocolate-brown.

FRUITING In small groups or fairy rings, mostly in grass.

Dimensions CAP ⟷ 5–8cm | STEM ↕ 4–8cm ↔ 0.8–2cm	Spores White	Edibility ☠

Family AMANITACEAE	Species *Limacella guttata*	Season Late summer–autumn

SLIME-VEIL FALSE LEPIOTA

The slightly greasy, convex cap of this species is creamy ocher to very pale red-brown. The stem is dry with a prominent ring that exudes a clear liquid, which dries as olive-brown spots. There is no volva at the stem base. The white gills are free and crowded. This white-fleshed, yeasty-smelling mushroom is edible but not recommended.

• **OCCURRENCE** Found in deciduous or coniferous forests, on rich soil among thick leaf litter. Widespread but local in Europe; in the Midwest and Rockies in North America.

• **SIMILAR SPECIES** *Limacella glioderma* is extremely slimy with an orange-brown cap. Some *Amanita* and *Lepiota* species are superficially similar, but neither genus has species with a slimy outer veil.

FRUITING Appears in troops of fruitbodies or singly in rich soil and litter in woodland areas.

Dimensions CAP ⟷ 7–15cm | STEM ↕ 8–14cm ↔ 1–2.5cm	Spores White	Edibility 🍽

Family AGARICACEAE	Species *Macrolepiota procera*	Season Summer–autumn

PARASOL LEPIOTA

This spectacular large mushroom is distinguished by a beautiful snakeskin pattern on its stem, which also has a large, movable ring. The cap is umbrella-shaped to flat with a raised, dark gray-brown center, and with a concentric pattern of attached scales. The pale flesh does not stain when bruised. Some consider this to be one of the best edible mushrooms.

• **OCCURRENCE** In dunes, dry grassland, and small grassy areas in woods and parks. Widespread and fairly common in Europe and North America.

• **SIMILAR SPECIES** The poisonous *Chlorophyllum molybdites* (p.166) has a stouter stalk and a green spore print. *M. rhacodes* (p.166).

cap center is dark gray-brown

concentric brown scales on cap surface

very tall stem with delicate snakeskin pattern

stem ring is large and movable

cap emerges egg-shaped, becoming umbrella-shaped or flat with a raised center

crowded, free, white to cream gills

slightly bulbous stem base

stem may be 4cm wide at base

FRUITING In scattered troops on sandy grass or soil.

Dimensions CAP ⟷ 10–30cm | STEM ↕ 15–30cm ↔ 0.8–2cm	Spores White or pale pink	Edibility

Family AGARICACEAE	Species *Macrolepiota rhacodes*	Season Summer–autumn

SHAGGY PARASOL LEPIOTA

This shaggy species has concentric, pale brown scales covering the surface of the convex cap, which flattens with age; very young specimens resemble flower bulbs. The stem has a prominent double ring. Its white flesh turns bright carrot-red when bruised. Although edible, some varieties cause stomach upsets, so only small quantities should be eaten (see also SIMILAR SPECIES).

• **OCCURRENCE** On rich soil in parks and gardens; also under conifers. Widespread and common throughout Europe and North America.

• **SIMILAR SPECIES** *Macrolepiota permixta* and *M. procera* (p.165) are larger, with snakeskin-patterned stems. *Chlorophyllum molybdites* (inset, below) is poisonous and has a green spore deposit.

young specimen already has pale brown scales

concentric scales on cap surface

prominent, movable double stem ring

gills are crowded

free gills are white to cream

SECTION

immature specimen with egg-shaped cap

white flesh first stains carrot-red then dark red

basal bulb to 4cm wide

smooth to fibrillose stem

cap margin is shaggy

FRUITING Appears in troops or fairy rings.

△ *CHLOROPHYLLUM MOLYBDITES* Also known as *Macrolepiota molybdites*, this scaly-capped species is pale brown, bruising red-brown, with a double stem ring. As they mature, the white gills become olive-green. ☠

Dimensions CAP ⇔ 5–15cm | STEM ↕ 10–15cm ↔ 1--2cm	Spores White	Edibility 🍽

Family AGARICACEAE	Species *Lepiota aspera*	Season Late summer–autumn

SHARP-SCALED LEPIOTA

This large species has a convex, off-white cap, covered with conical or pyramidal brown scales that wear away with age. The stem is brown with a large, pendent, dark-rimmed ring and a swollen base; its surface is scaly or fibrous below the ring. It has an unpleasant smell and may be poisonous.

• **OCCURRENCE** In woods along roadsides in rich, alkaline soil. Widespread in northern temperate zones.

• **SIMILAR SPECIES** *Lepiota hystrix* exudes brown liquid from its very dark scales. *L. perplexum* tends to be smaller with less crowded gills. *Macrolepiota procera* (p.165) has a movable stem ring and a faint, pleasant smell.

FRUITING Appears singly or in small groups.

SECTION

Dimensions CAP ⊕ 5–15cm | STEM ↕ 5–12cm ↔ 0.5–1.5cm	Spores White	Edibility ☠

Family AGARICACEAE	Species *Lepiota oreadiformis*	Season Autumn

EURO GRASS LEPIOTA

A conical cap and crowded, thin, free white gills make this species typical of the genus; however, unlike most *Lepiota* species, the stem ring is hardly visible. The overall coloring of the fruitbody is off-white to cream, with the cap having a browner center. The stem is girdled with the remains of the veil, and the cap margin also bears veil remnants. Some mycologists separate *L. oreadiformis* into three or more distinct species.

• **OCCURRENCE** In dry open grassland, often in coastal sites and on sand dunes. Widespread throughout Europe; not reported in North America.

• **SIMILAR SPECIES** *Marasmius oreades* (p.117) is superficially similar but has adnexed gills, tough flesh, and no sign of any veil remnants.

FRUITING In troops of fruitbodies among lichens and short grass in open grassland and coastal sites.

Dimensions CAP ⊕ 2–6cm | STEM ↕ 3–5cm ↔ 0.8–1.2cm	Spores White	Edibility 🍽

Family AGARICACEAE	Species *Lepiota ignivolvata*	Season Throughout autumn

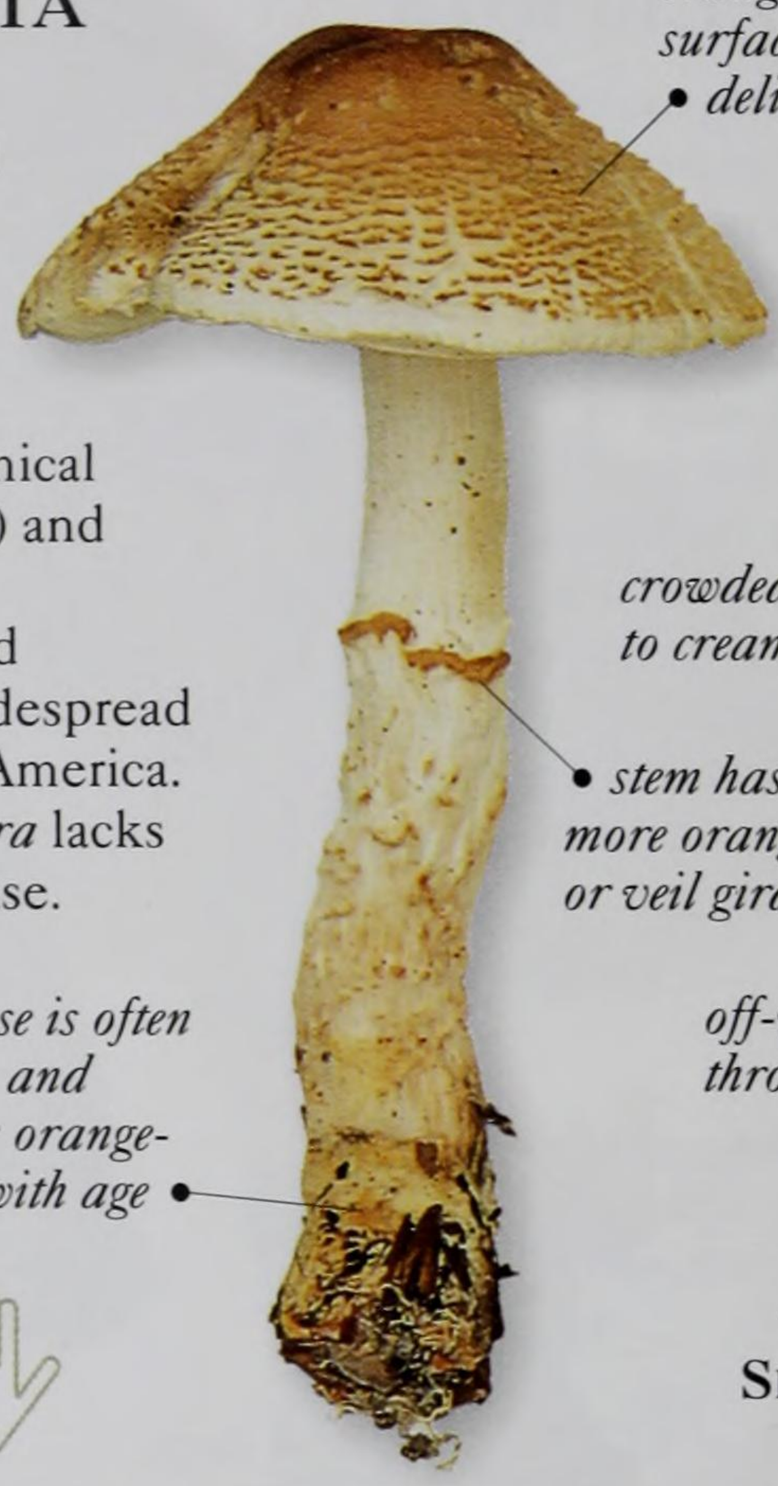
EURO ORANGE LEPIOTA

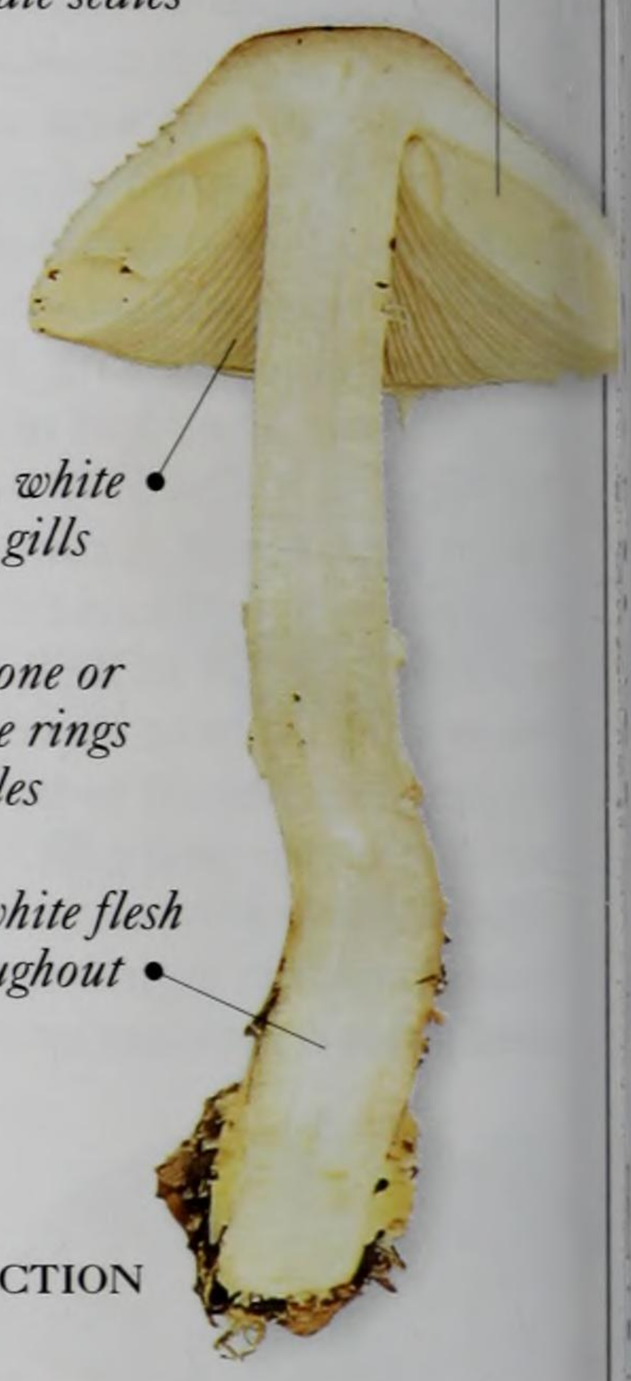
This fairly fleshy *Lepiota* species is best identified by its orange-margined ring, situated low on the club-shaped white stem. The convex cap has concentric, fine, orange-brown scales and a raised ocher-brown center. Its off-white flesh has an unpleasant chemical smell, reminiscent of *L. cristata* (p.169) and similar to the odor when metal is cut.

• **OCCURRENCE** Under conifers and deciduous trees on calcareous soil. Widespread across Europe; not reported in North America.

• **SIMILAR SPECIES** *L. ventriosospora* lacks the orange on the veil and the stem base.

FRUITING Appears in troops or singly in leaf litter.





SECTION

Dimensions CAP ⟷ 4–11cm | STEM ↕ 5–15cm ↔ 0.5–2cm	Spores White	Edibility ☠

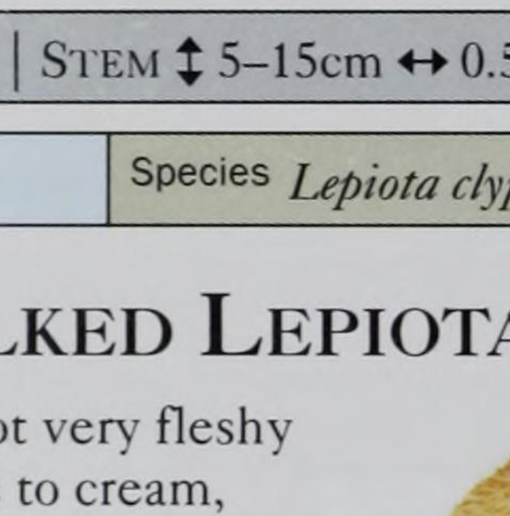
Family AGARICACEAE	Species *Lepiota clypeolaria*	Season Throughout autumn

SHAGGY-STALKED LEPIOTA

This fairly large but not very fleshy species is mainly white to cream, although the bell-shaped to flat cap may have brown-tinged scales; the specimen shown is a brown example. The cap margin and the stem bear clear remnants of the pure white veil, making young specimens appear shaggy. The faint-smelling flesh is white to pale brown. The spores are spindle-shaped.

• **OCCURRENCE** In deciduous or coniferous forests on fertile soil among leaf litter or on needle beds. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *Lepiota alba* grows in open habitats and has a smoother stem. *L. ventriosospora* has yellow or yellow-brown tinges to the stem veil and cap.



SECTION

FRUITING Appears singly or in small groups.

Dimensions CAP ⟷ 3–7cm | STEM ↕ 5–12cm ↔ 0.5–1cm	Spores White	Edibility ☠

Family AGARICACEAE	Species *Lepiota cristata*	Season Summer–autumn

BURNT-RUBBER LEPIOTA

This is the most common of the smaller *Lepiota* species. Its best identification characteristics are its pale colors, the concentric pattern of flat, orange-brown scales on the convex cap, and an unpleasant chemical smell. The stem ring is short lived but can be seen as an upturned cuff on younger specimens.

• **OCCURRENCE** In lawns, among mosses, or near nettles, at the edges of paths and roads, on fairly rich soil. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** The very poisonous *L. lilacea* is much rarer, with a similar shape but with purple to purple-brown colors.

FRUITING In small groups or troops on bare soil.

Dimensions CAP ⇔ 1–4cm | STEM ↕ 2.5–5cm ↔ 2–4mm	Spores White	Edibility ☠

Family AGARICACEAE	Species *Lepiota castanea*	Season Throughout autumn

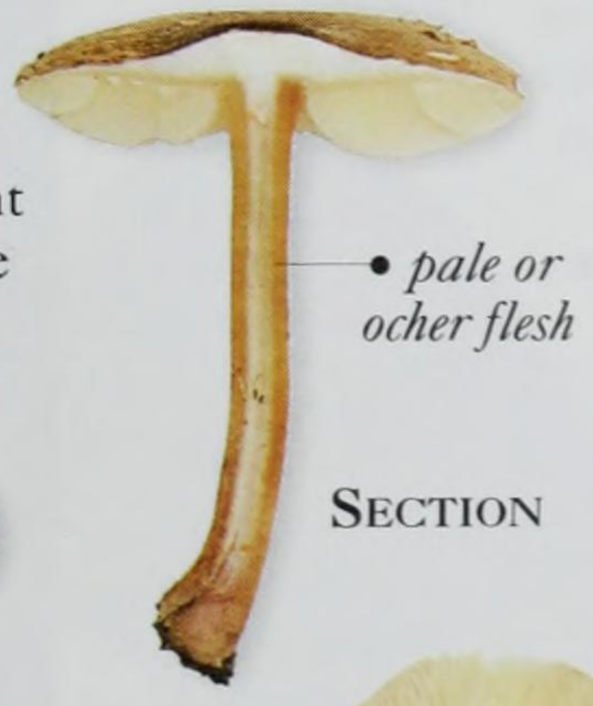
DEADLY LEPIOTA COMPLEX

This small and dark species has dark brown scales on both the convex to flat cap and the stem. It also has a strong, fairly unpleasant smell. The stem ring is short lived. Microscopic features are important when identifying small *Lepiota* species; the genus has three different spore shapes: projectile, egg, or spindle. Those of *L. castanea* are projectile-shaped.

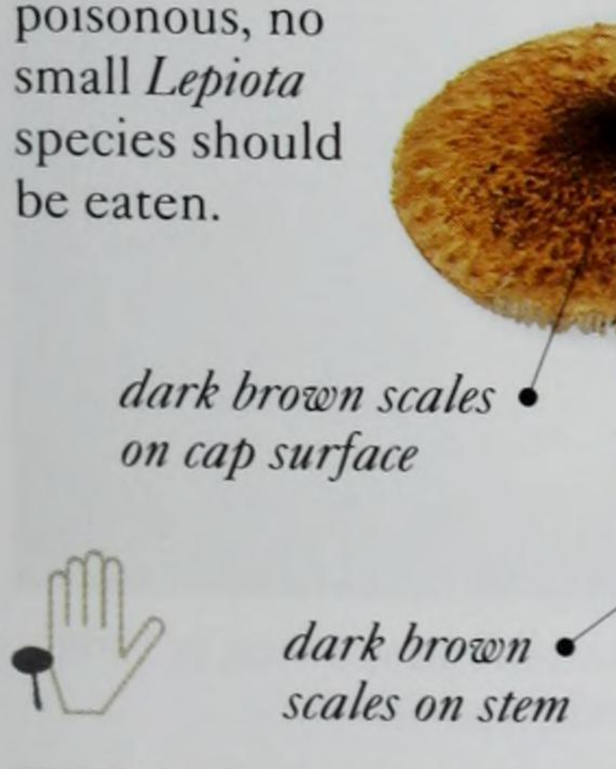
• **OCCURRENCE** On disturbed rich soil, often along woodland ditches and paths. Widespread, mostly in the south of northern temperate zones.

• **SIMILAR SPECIES** *L. fulvella* is paler orange-brown and bigger; *L. pseudohelveola* has a more prominent stem ring and a fainter smell. Because some are deadly and many are poisonous, no small *Lepiota* species should be eaten.

△ *LEPIOTA BRUNNEOINCARNATA* The convex cap of this sturdy species has concentric, dark pink-brown scales on the surface. The pink-tinged stem has dark scales below the indistinct ring zone. ☠



SECTION



FRUITING Mostly a few fruitbodies together.

Dimensions CAP ⇔ 2–4cm | STEM ↕ 2–5cm ↔ 2–4mm	Spores White	Edibility ☠

Family AGARICACEAE	Species *Leucocoprinus badhamii*	Season Late summer–late autumn

EURO RED-STAINING LEPIOTA

Initially almost white, with a pattern of delicate, pale brown scales on the flattened cap, any part of this agaric turns saffron-red or deep blood-red when handled, finally becoming nearly black. It belongs to a group of rare, red-staining species that are considered to be toxic. Prominent on the velvety stem, the ring is fragile and turns upward. The edible, red-staining *L. americana* occurs in sawdust and plant debris.

• **OCCURRENCE** Found growing on calcareous or nutrient-rich soil, among leaf and garden litter, or on needle beds; particularly under yew trees but also under deciduous trees. Widespread in the warmer parts of Europe; not known in North America.

FRUITING Singly or in small groups on rich soil.

SECTION

Dimensions CAP ⇹ 3–8cm | STEM ↕ 3–7cm ↔ 4–8mm	Spores White	Edibility ☠

Family AGARICACEAE	Species *Leucocoprinus luteus*	Season All year

FLOWERPOT LEPIOTA

This species has distinctive yellow coloring. The surface of the bell-shaped cap has fine, golden yellow to orange-yellow or yellow-brown scales on a sulfur-yellow ground. The stem is a similar color with a short-lived ring and becomes club-shaped toward the base, which is up to 6mm wide. The gills are also yellow and are crowded and free. Inedible, possibly poisonous, it has thin yellow flesh. The fruitbodies are short lived, almost like those of the Inky Caps (*Coprinus*, pp.174–76); the genus name means White Inky Cap, a reference to the white spore deposit.

• **OCCURRENCE** In flowerpots and greenhouses in northern temperate zones, or in the wild in warm subtropical or tropical climates; widespread.

FRUITING Often found growing in tufts on soil that is rich in compost.

Dimensions CAP ⇹ 1–5cm | STEM ↕ 4–10cm ↔ 2–4mm	Spores White	Edibility 🍽

WITHOUT VEIL

THIS SUBSECTION FEATURES one genus, *Pluteus*. It is the only genus to combine gills that are free of the stem with a complete lack of a universal veil. All the species in the genus produce pink spore deposits and have very crowded gills. The majority of species grow on decayed wood, either in the form of fallen trunks or on beds of wood chips or sawdust.

The genus *Volvariella* is a close relative of *Pluteus*, but *Volvariella* species, such as *V. bombycina* (p.154), have a universal veil that covers the immature fruitbody; the veil splits to reveal a volva at the base.

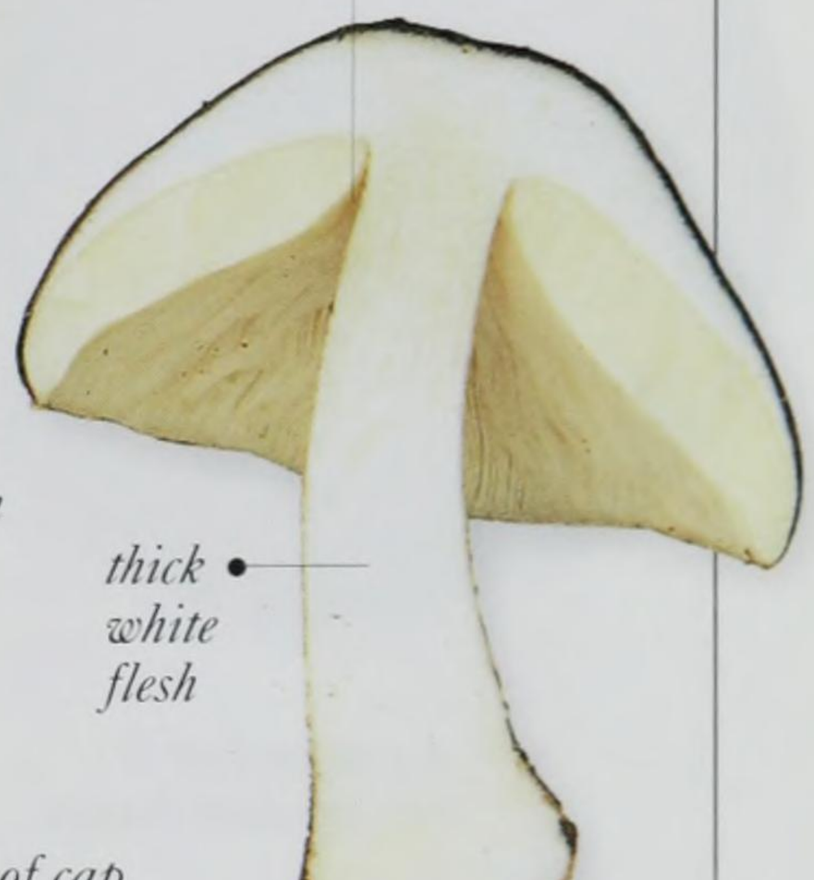
Family PLUTEACEAE	Species *Pluteus cervinus*	Season Late spring–late autumn

FAWN PLUTEUS

Typically, this highly variable species has a dark brown cap and a white stem, with dark fibers that are particularly pronounced at the club-shaped base. The cap may be convex to umbonate or flat; its surface is felted at the center and greasy when wet. It is edible but has an indistinct taste.

• **OCCURRENCE** On decaying deciduous trees in woods, parks, and gardens; it reaches its most impressive dimensions when growing on sawdust or wood chips. Widespread in northern temperate zones and extending south.

• **SIMILAR SPECIES** *Entoloma* species, many of which are poisonous, have a similar spore print color, attached gills, and occur on the ground or near very rotten wood.



SECTION

FRUITING Singly or in small groups of fruitbodies.

Dimensions CAP ⇹ 4–10cm | STEM ↕ 4–10cm ↔ 0.5–1.5cm	Spores Pale pink	Edibility

Family PLUTEACEAE	Species *Pluteus umbrosus*	Season Summer–autumn

VELVETY PLUTEUS

Velvety, dark brown cap and stem surfaces and dark gill edges make this *Pluteus* species easy to identify. Its cap is umbonate with a radiating vein pattern on the surface, while the pale stem is heavily dotted with brown scales. The flesh is white to pale brown and smells acidic.

• **OCCURRENCE** Often on large-diameter, naturally decaying deciduous trunks alongside other *Pluteus* species. Widespread in northern temperate zones; mostly uncommon.

• **SIMILAR SPECIES** *P. cervinus* (p.171) is darker, with no vein patterning on the cap. *P. atromarginatus* is similar but grows on conifer wood and has different microscopic characters.

fringed cap margin

umbo in cap center

radiating vein pattern on cap surface

heavy brown dotting on pale stem

grows on well-rotted deciduous trees

paler cap flesh may be visible in places

cap surface is velvety dark brown

gills are pale pink-brown

gill edges are downy and brown

SECTION

gills are free of stem

white to pale brown flesh in stem

crowded, soft gills

FRUITING Appears singly or in small groups.

Dimensions CAP ⇔ 4–11cm | STEM ↕ 5–8cm ↔ 0.4–2cm	Spores Pale pink	Edibility

Family PLUTEACEAE	Species *Pluteus aurantiorugosus*	Season Summer–autumn

FLAME PLUTEUS

This species has a vivid, flame-red cap that varies from convex to nearly flat; the color makes it easy to distinguish from its relatives. The cap surface consists of round cells, making it very delicate, in contrast to the fiber-covered *Pluteus cervinus* (p.171). The pale, more or less yellow stem curves, allowing the fruitbody to fit inside the cracks and hollows of decaying wood. It has no distinctive smell or taste.

• **OCCURRENCE** On fallen trunks or logs, or on pollarded trees such as poplar, ash, and elm. Widespread but uncommon in northern temperate zones.

• **SIMILAR SPECIES** *P. admirabilis*, a North American species, is more golden.

FRUITING Singly or in small groups on decaying wood.

Dimensions CAP ⟷ 2–5cm | STEM ↕ 3–8cm ↔ 3–6mm	Spores Pale pink	Edibility

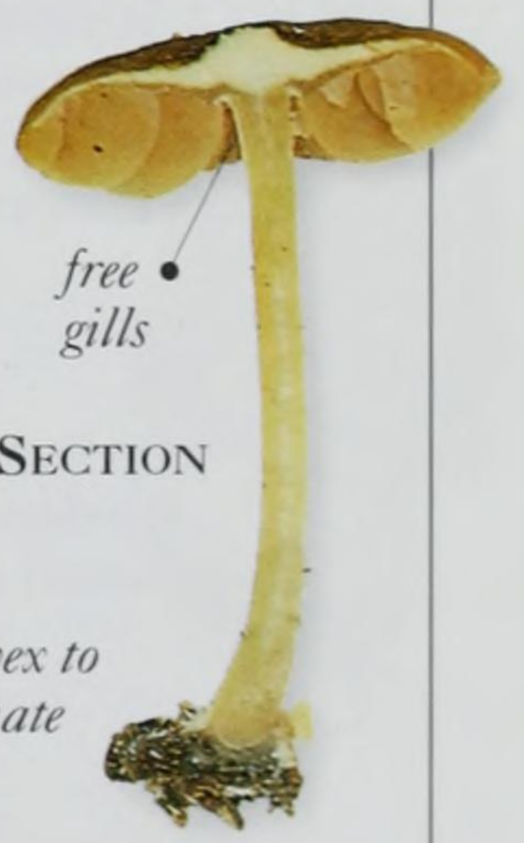
Family PLUTEACEAE	Species *Pluteus chrysophaeus*	Season Summer–autumn

GOLDEN PLUTEUS

There are many forms of this conspicuous species, thought by some experts to be separate species. Although all have yellow caps and pale yellow stems, the color distribution and intensity vary. The cap is convex to umbonate with a smooth surface, the margins showing striations when wet. The stem is paler than the cap, and the off-white to yellow flesh is odorless and tasteless.

• **OCCURRENCE** On well-rotted deciduous stumps and fallen, moss-covered trunks. Widespread in Europe and eastern North America.

• **SIMILAR SPECIES** *P. xanthophaeus* has green tones, whereas *P. chrysophaeus* tends toward reddish. *P. romellii* has a darker cap and yellow coloring at the stem base.



FRUITING Singly or in small groups on rotten wood.

Dimensions CAP ⟷ 1–6cm | STEM ↕ 3–8cm ↔ 3–8mm	Spores Pale pink	Edibility

INKY WITH AGE

THIS SUBSECTION consists solely of a selection of members of the large genus *Coprinus*, the Inky Caps. Most species of *Coprinus* have gills that dissolve (deliquesce) from the margin inward into an inklike liquid, colored black by mature spores. Other spores are shot into the air, just before the dissolving process reaches the point on the gills where the spores are produced. The gills are usually much more crowded than in most agarics.

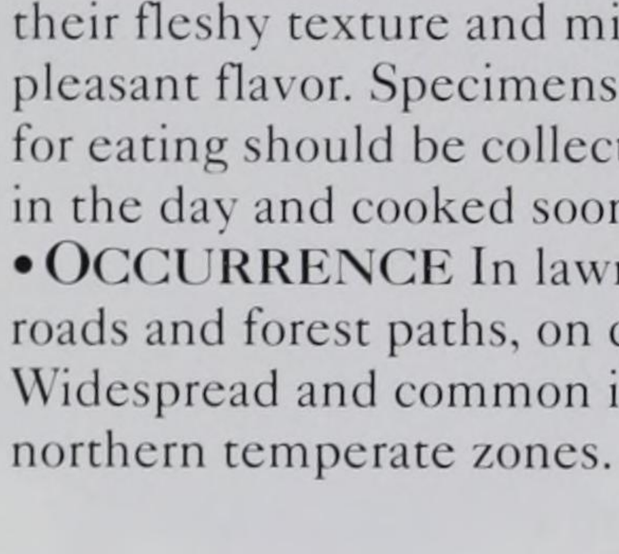
Coprinus species are often tiny with thin flesh, and many grow on the dung of herbivorous animals such as deer, cows, horses, and rabbits.

Family COPRINACEAE	Species *Coprinus comatus*	Season Autumn

SHAGGY-MANE INKY CAP

The cap of this species is either an elongated egg shape or broadly conical. It is 5–20cm high and has a shaggy or scaly surface that is off-white to pink tinged, soon becoming black from the margin. The stem has a distinctive ring that stains black by falling spores. This species deliquesces quickly and is more fleshy than most members of the genus. The young fruitbodies are popular edibles because of their fleshy texture and mild, pleasant flavor. Specimens for eating should be collected early in the day and cooked soon after.

• OCCURRENCE In lawns and along roads and forest paths, on disturbed soil. Widespread and common in northern temperate zones.



FRUITING Appears in large troops of fruitbodies.

Dimensions CAP ⇔ 2–6cm | STEM ↕ 10–35cm ↔ 1–2cm	Spores Black	Edibility

Family COPRINACEAE	Species *Coprinus atramentarius*	Season Spring–autumn

ALCOHOL INKY CAP

The cap of this fleshy species is egg-shaped, expanding to become slightly umbonate with age. Gray to gray-brown, it deliquesces slowly from the margin. It causes palpitations and nausea if eaten with alcohol; avoid drinking alcohol for several days after eating this mushroom. A more red-brown, scaly form is sometimes called *Coprinus romagnesianus*.

• **OCCURRENCE** In woods, parks, and gardens, at soil level but always associated with decaying deciduous stumps or dying trees. Often found growing on the base of unhealthy city trees. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *Coprinus insignis* has warty spores; *C. micaeus* is smaller and more fragile. It has a brownish cap with glistening granules (when young).

FRUITING In dense clusters of fruitbodies.

Dimensions CAP ⊕ 3–7cm | STEM ↕ 5–12cm ↔ 0.8–1.5cm	Spores Black	Edibility

Family COPRINACEAE	Species *Coprinus picaceus*	Season Autumn

MAGPIE INKY CAP

This unmistakable mushroom has a black and white pattern on the cylindrical or bell-shaped cap, caused by the veil breaking up into scales as the cap expands. The cap is 5–10cm high; the stem is tall and white, with a fine fleecy covering. It has an unpleasant, fetid smell and is not recommended as an edible.

• **OCCURRENCE** In deciduous woods; occasionally occurs in great numbers where wood chips have been used as a mulch. Widespread in beech regions of Europe; reported in California.

FRUITING Appears singly or in small clusters.

Dimensions CAP ⊕ 2–6cm | STEM ↕ 8–30cm ↔ 0.6–2cm	Spores Black	Edibility

Family COPRINACEAE	Species *Coprinus micaceus*	Season Late spring–early winter

MICA INKY CAP

Grainy veil remnants create a sheen on the surface of the egg-shaped to slightly expanded, pleated, tawny brown cap of this species, which has a splitting or lobed margin. The stem is white, thin, and fragile; the flesh is pale. The mycelium produces many fruitings in one season.

• **OCCURRENCE** Abundant both in urban areas and in the heart of wood, on and around old stumps and unhealthy trees. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** Some close relatives produce a thick, orange-yellow mat (ozonium) on the substrate. One of these, *Coprinus domesticus*, is often found in damp cellars. Along with others, it is also found behind loose bathroom tiles and in other damp sites. *C. radicans* is another, like *C. domesticus*, that produces ozonium. *C. micaceus* is most common near the base of elm stumps.

FRUITING In dense clusters of fruitbodies.

Dimensions CAP ⊕ 2–4cm | STEM ↕ 4–10cm ↔ 2–5mm	Spores Black	Edibility

Family COPRINACEAE	Species *Coprinus niveus*	Season Summer–autumn

SNOW-WHITE INKY CAP

Best identified by its snow-white coloring and the loose, mealy remnants of the veil over its cap surface, this species is quite small, although not the tiniest of the *Coprinus*. The conical to bell-shaped cap has an upturned margin, the crowded gills are gray when young, black when mature, and the stem has a slightly swollen base. The inedible flesh is very thin and pale.

• **OCCURRENCE** Nearly always found on fairly fresh horse manure in wet grass. Widespread and common in Europe and North America.

• **SIMILAR SPECIES** *C. cortinatus* grows on soil. *C. cothurnatus* often has brown scales at the cap center. Tiny *C. friesii* is found growing on rotten grass. *C. stercoreus* has a slight, fetid smell.

FRUITING Appears in groups of a few fruitbodies.

Dimensions CAP ⊕ 1–3cm | STEM ↕ 5–8cm ↔ 1–3mm	Spores Black	Edibility

WITH GILLS JOINED TO A COLLAR

THIS SUBSECTION FEATURES species from a group of agarics that have gills attached to a "wheel" (collarium), rather than being free or joining the stem. The arrangement resembles the spokes of a bicycle wheel. Most species in the group are in the genus *Marasmius* and occur in the tropics.

Family TRICHOLOMATACEAE	Species *Marasmius rotula*	Season Midsummer–autumn

PINWHEEL MARASMIUS

The gills of this species are attached to a little "wheel," or collar, rather than the stem top. The convex ivory cap has a darker, navel-like center, deep, radial grooves, and thin, tough, off-white flesh. This mushroom can revive after being totally desiccated.

• **OCCURRENCE** On twigs and branches in deciduous and coniferous woods. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** Many other *Marasmius* species also have a "wheel"; most occur in tropical rainforests, but a few tiny species can also be found in temperate zones: brick-red *M. curreyi* grows in grass; pale brown *M. bulliardii* occurs in swarms on leaf litter in damp woods; pale *M. limosus* grows on reeds. *Marasmiellus ramealis* (p.139), found in similar sites, lacks the gill "wheel" and the cap grooves.

FRUITING Appears in troops of fruitbodies.

Dimensions CAP ⟷ 0.5–2cm | STEM ↕ 2–4cm ↔ 1mm	Spores Off-white	Edibility

Family COPRINACEAE	Species *Coprinus plicatilis*	Season Early summer–autumn

UMBRELLA INKY CAP

When fully expanded, the cap of this small *Coprinus* species has a pleated surface, resembling a Japanese umbrella. The cap is smooth, without hairs or veil remnants. The gills are joined to a collar, are more distant, and become less inky than in most *Coprinus* species (pp.174–76).

• **OCCURRENCE** In lawns, appearing after rainfall. Widespread and common in northern temperate zones.

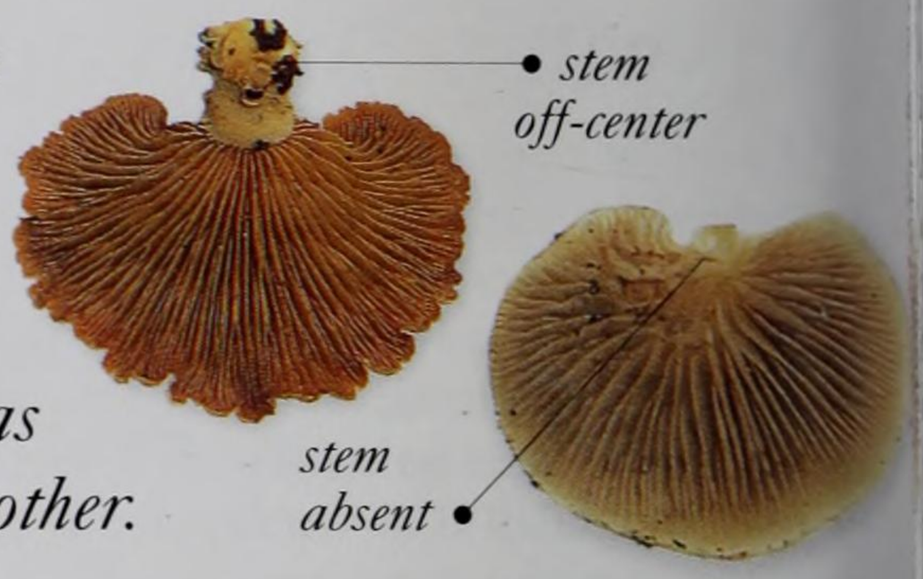
• **SIMILAR SPECIES** *C. auricomus* tends to be a bit bigger and has a browner cap. A microscope reveals thick-walled brown hairs, confirming its identity. Other similar species include *C. kuehneri*, *C. leiocephalus*, and *C. nudiceps*. They can be distinguished only by carefully measuring the spores.

FRUITING Singly or in small groups. Appears overnight and withers by noon.

Dimensions CAP ⟷ 0.8–2cm | STEM ↕ 4–8cm ↔ 1–2mm	Spores Black	Edibility

CAP FUNGI WITH STEM OFF-CENTER OR ABSENT

Among the gilled fungi are some species with a stem that is not centrally placed under the cap. It may be attached to the side of the cap and, in some species, can be very small. Other gilled species lack a stem altogether. Most of these fungi are known as oyster mushrooms, but not all are related to each other.



Family POLYPORACEAE	Species *Pleurotus ostreatus*	Season Autumn–winter

COMMON OYSTER MUSHROOM

The cap of this species is more or less oyster-shaped; in Europe, the coloring ranges from cream to almost black; in North America, from cream to gray-brown. The white stem is positioned at the cap margin or may be absent. The white flesh has a pleasant taste, and its firm texture makes it a popular edible. The complex is now commercially cultivated. This species prefers cold weather and appears later in the season than some similar species (see below).

• **OCCURRENCE** On a wide range of dead or dying deciduous trees; more rarely on conifers. Widespread in northern temperate zones.

• **SIMILAR SPECIES** *Pleurotus dryinus* has a veil on the stem when young. *P. pulmonarius* is cream to pale brown; it appears earlier in the season.

FRUITING In tiers and rows on deciduous trees.

△ ***LENTINELLUS URSINUS***
Although edible, this species has a bitter taste. The cap is densely hairy and pale brown, and the gills have toothed edges. 🍽

Dimensions CAP ⟷ 6–20cm | STEM ↕ 0–5cm ↔ 1–2cm	Spores Pale gray-lilac	Edibility 🍽

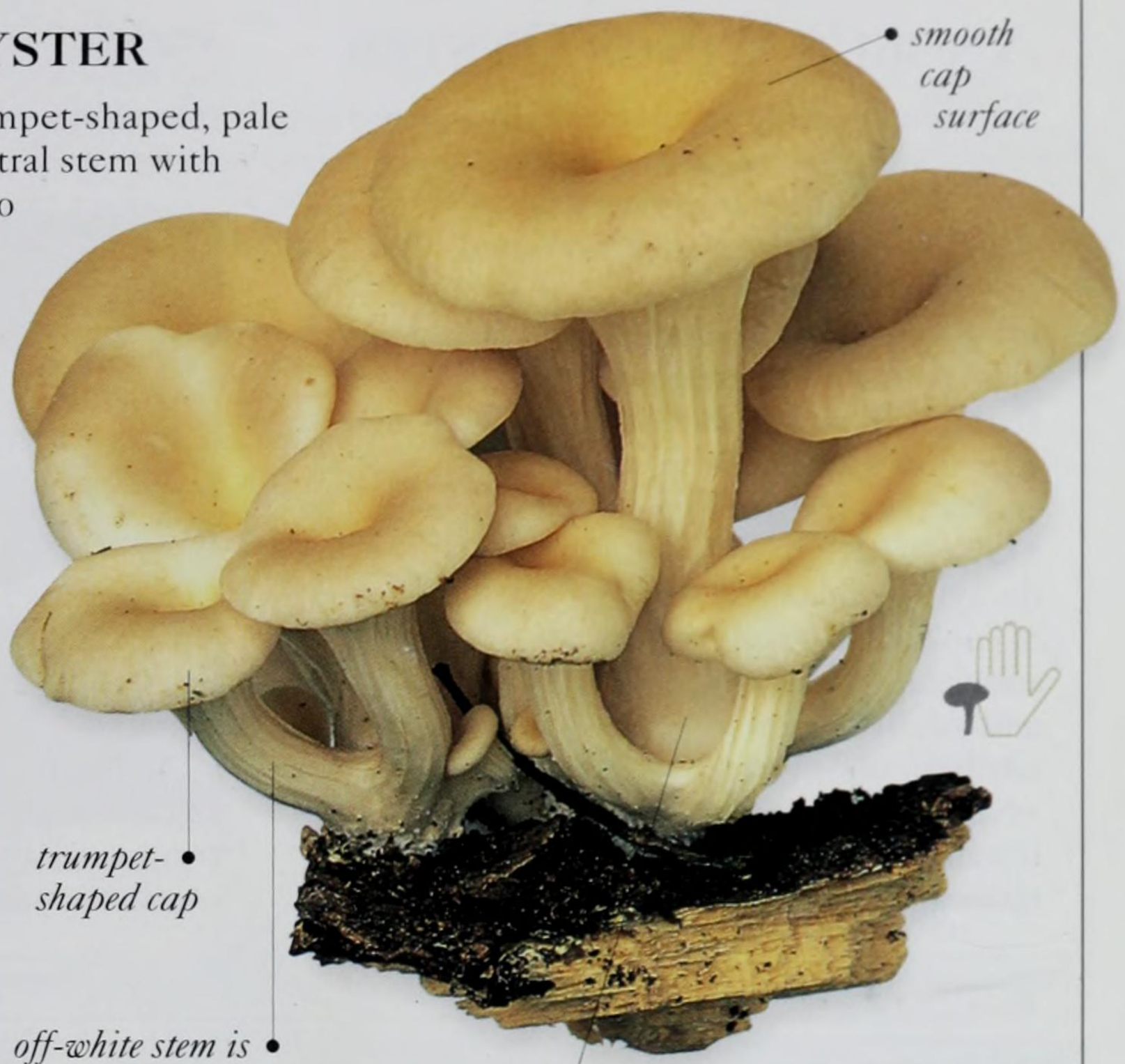
Family POLYPORACEAE	Species *Pleurotus cornucopiae*	Season Spring–autumn

EURO TRUMPET OYSTER

This species has a distinctive trumpet-shaped, pale leather-brown cap and a fairly central stem with decurrent gills that join together to form a net. The white flesh has a pleasant taste and smells floury.

• **OCCURRENCE** Forms a white rot on deciduous trees, often elm; it has increased where Dutch elm disease has left abundant substrate. Widespread but mainly in southern Europe; not reported in North America.

• **SIMILAR SPECIES** *Pleurotus citrinopileatus* occurs in east Asia and is yellow. *P. pulmonarius* has simple gills and less of a stem.



△ *PLEUROTUS ERYNGII*
This European choice edible occurs on umbellifer roots. The pale cap has a suedelike surface and an inrolled margin. The stem is off-center or absent.

FRUITING Appears in clustered groups or singly.

Dimensions CAP ⊕ 4–12cm | STEM ↕ 1–5cm ↔ 0.5–2.5cm	Spores Pale lilac	Edibility

Family AURISCALPIACEAE	Species *Lentinellus cochleatus*	Season Late summer–autumn

COCKLESHELL LENTINELLUS

This species has a more or less cockleshell-shaped, smooth, red-brown cap with an inrolled margin. The stem is attached to one side. The pale white-brown gills are decurrent and, like all *Lentinellus* species, have toothed edges. Some smell of anise; others are odorless.

• **OCCURRENCE** Rotting deciduous stumps. Widespread in northern temperate zones; locally common.

• **SIMILAR SPECIES** *Clitocybe* species have central stems; *Pleurotus* species have gills with smooth edges.

FRUITING Appears in layered clusters on rotting stumps of deciduous trees.

Dimensions CAP ⊕ 2–6cm | STEM ↕ 2–5cm ↔ 0.8–1.5cm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Pleurocybella porrigens*	Season Autumn

ANGEL'S WINGS OYSTER

This small edible species is easily noticed from a distance because its light coloring contrasts strongly with the dark wood substrate. It has a clean, fan-shaped, stemless fruitbody with a distinct incurved margin and crowded gills. It is white, becoming tinted with yellow as it ages. The thin white flesh smells and tastes pleasant.

• **OCCURRENCE** On the decaying trunks and stumps of coniferous wood, such as spruce and fir. Widespread and locally common in northern temperate zones.

• **SIMILAR SPECIES** *Panellus mitis* is much smaller and grows on the twigs and branches of conifers.

FRUITING Appears in large clusters on decaying conifers in open or dense woodlands.

Dimensions FRUITBODY ↕ 2–10cm ↔ 2–7cm	Spores White	Edibility

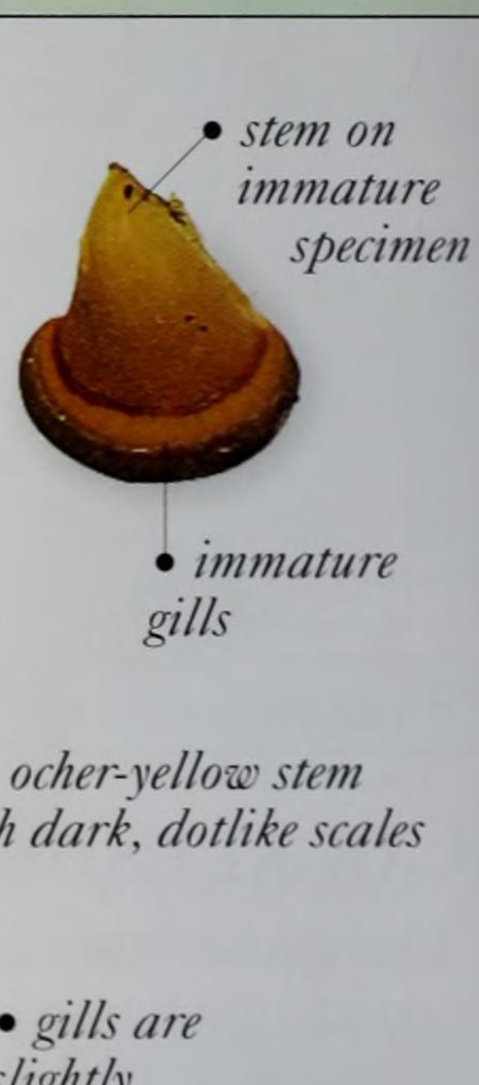
Family TRICHOLOMATACEAE	Species *Panellus serotinus*	Season Late autumn

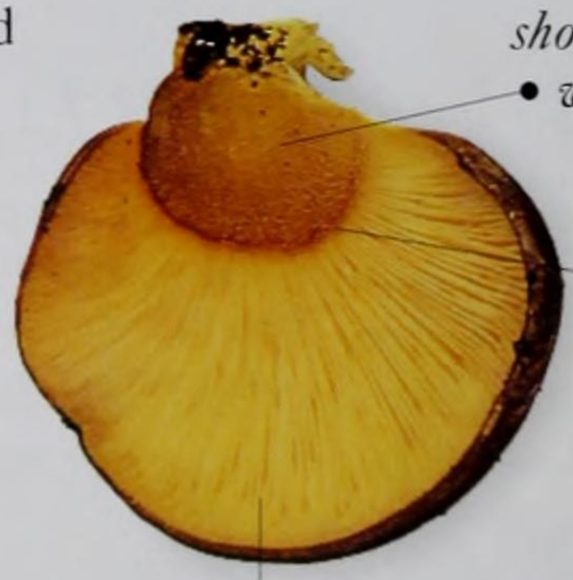
FALL OYSTER MUSHROOM

Shaped like an oyster mushroom (*Pleurotus*, pp.178–79), the Fall Oyster Mushroom is easy to identify. It has olive and yellow coloring, a velvety cap surface, and a short, indistinct stem. Not worthwhile as an edible, it has more or less gelatinous white flesh, which tastes mild to slightly bitter and smells faintly mushroomy. Some mycologists prefer to classify *Panellus serotinus* in the genus *Sarcomyxa*.

• **OCCURRENCE** Often found fruiting near water on dead or living tree trunks and fallen branches, rarely on conifers. Widespread throughout northern temperate zones.

• **SIMILAR SPECIES** The stemless, ocher-gilled *Phyllotopsis nidulans* is similar to old or atypical specimens but has an ocher-pink spore deposit.





FRUITING In often dense rows of fruitbodies.

Dimensions CAP ⊕ 3–10cm | STEM ↕ 0.8–1.5cm ↔ 0.5–1cm	Spores White	Edibility

Family TRICHOLOMATACEAE	Species *Panellus stypticus*	Season Autumn–winter

LUMINESCENT PANELLUS

This inedible small, oyster-shaped, pale leather-brown species has tough fruitbodies that usually survive until spring. It has a mealy cap surface and a very short stem. The off-white to pale yellow flesh has an aromatic, fruity smell but tastes bitter and astringent. American specimens have luminescent gills, but European ones do not.

• **OCCURRENCE** In woods on stumps of deciduous trees such as beech and oak. Widespread in northern temperate zones; common in eastern North America.

• **SIMILAR SPECIES** *Panellus mitis* is whiter, smaller, and has a mild taste. It occurs very late in the season on conifers.

FRUITING Appears in crowded tiers and rows.

Dimensions CAP ⊕ 1–4cm | STEM ↕ 0.1–1cm ↔ 2–7mm	Spores Off-white	Edibility

Family SCHIZOPHYLLACEAE	Species *Schizophyllum commune*	Season All year

SPLIT-GILL MUSHROOM

This fan-shaped mushroom belongs to a genus distinguished by gill-like structures that are split lengthwise, the two parts curling inward in dry conditions to protect the spore-bearing hymenium. Stemless, or with a short, stemlike base, it is covered with gray-white felt. The tough, pale flesh is reportedly eaten by certain tribal people and has been used as a chewing gum. Easily cultivated on artificial substrates, this species is popular for research in genetics and anatomy.

• **OCCURRENCE** On a wide range of woody substrates, also on straw bales, mostly in exposed sites: it is able to grow on sun-baked or wind-dried wood, often driftwood. Locally, it can have substrate preferences – beech in northern Europe, for example. Widespread and common in northern temperate zones; absent from northernmost areas.

FRUITING Fans appear in crowded tiers.

Dimensions FRUITBODY ⊕ 1–5cm	Spores White	Edibility

Family PAXILLACEAE	Species *Paxillus atrotomentosus*	Season Summer–autumn

VELVET PAX

This fleshy, velvet-covered species has a dark brown cap with a depressed center and an inrolled margin. Its thick stem is usually attached to the side of the cap. The soft, cream to brown gills are crowded, and the pale flesh is bitter and odorless.

• **OCCURRENCE** Mycorrhizal; in woods and tree stands, on and around conifer stumps. Widespread and common in many northern temperate regions; common in eastern North America.

• **SIMILAR SPECIES** *P. panuoides* is thinner and paler, has no real stem, and occurs on conifer wood. It may belong to the genus *Tapinella*.

FRUITING Singly or a few together around stumps.

SECTION

Dimensions CAP ⊕ 10–25cm | STEM ↕ 5–10cm ↔ 2–5cm	Spores Yellowish brown	Edibility

Family PAXILLACEAE	Species *Paxillus corrugatus*	Season Summer–autumn

CRINKLE-GILLED PAX

Distinctly furrowed and ridged gills are the most easily recognized features of this stemless, shelf-forming, yellowish brown to olive-orange species. It has an oyster-shaped cap and widely spaced, yellow to orange gills. Not mycorrhizal like *P. involutus* (p.35), this species may be closely related to the genus *Pseudomerullius*.

• **OCCURRENCE** Found growing on dead conifers and deciduous trees. Widespread and common in eastern North America; absent from Europe.

• **SIMILAR SPECIES** *Paxillus panuoides*, a species found in Europe, Asia, and Japan, is similar but with mostly even gills.

FRUITING Large, shelved clusters on trees in woodland and parks.

Dimensions FRUITBODY ⊕ 5–10cm	Spores Olive-buff	Edibility

Family CREPIDOTACEAE	Species *Crepidotus mollis*	Season Autumn

SOFT CREP

The gelatinous surface and flesh of this species distinguishes it from the many, mostly smaller, *Crepidotus* species. The smooth, oyster- to fan-shaped cap changes color from gray-brown to off-white as it dries; when it is wet, radiating striations are clearly visible at the margin. The stem is very rudimentary or absent. The cap skin is easily peeled from the pale cap flesh, which may have a weak smell.

• **OCCURRENCE** On dead trunks of deciduous trees such as elm, ash, poplar, and beech. Widespread in northern temperate zones.

• **SIMILAR SPECIES** Closely related *C. calolepis* has pale brown scales toward the point where the cap is attached to its deciduous substrate.

FRUITING Singly or in tiers of fruitbodies.

Dimensions CAP ⟷ 2–7cm	Spores Tobacco-brown	Edibility

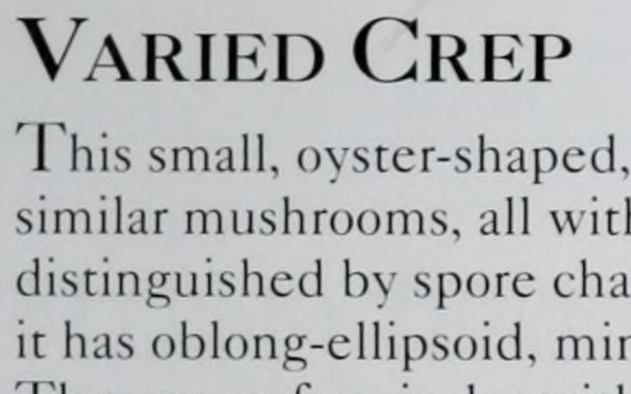
Family CREPIDOTACEAE	Species *Crepidotus variabilis*	Season Summer–early autumn

VARIED CREP

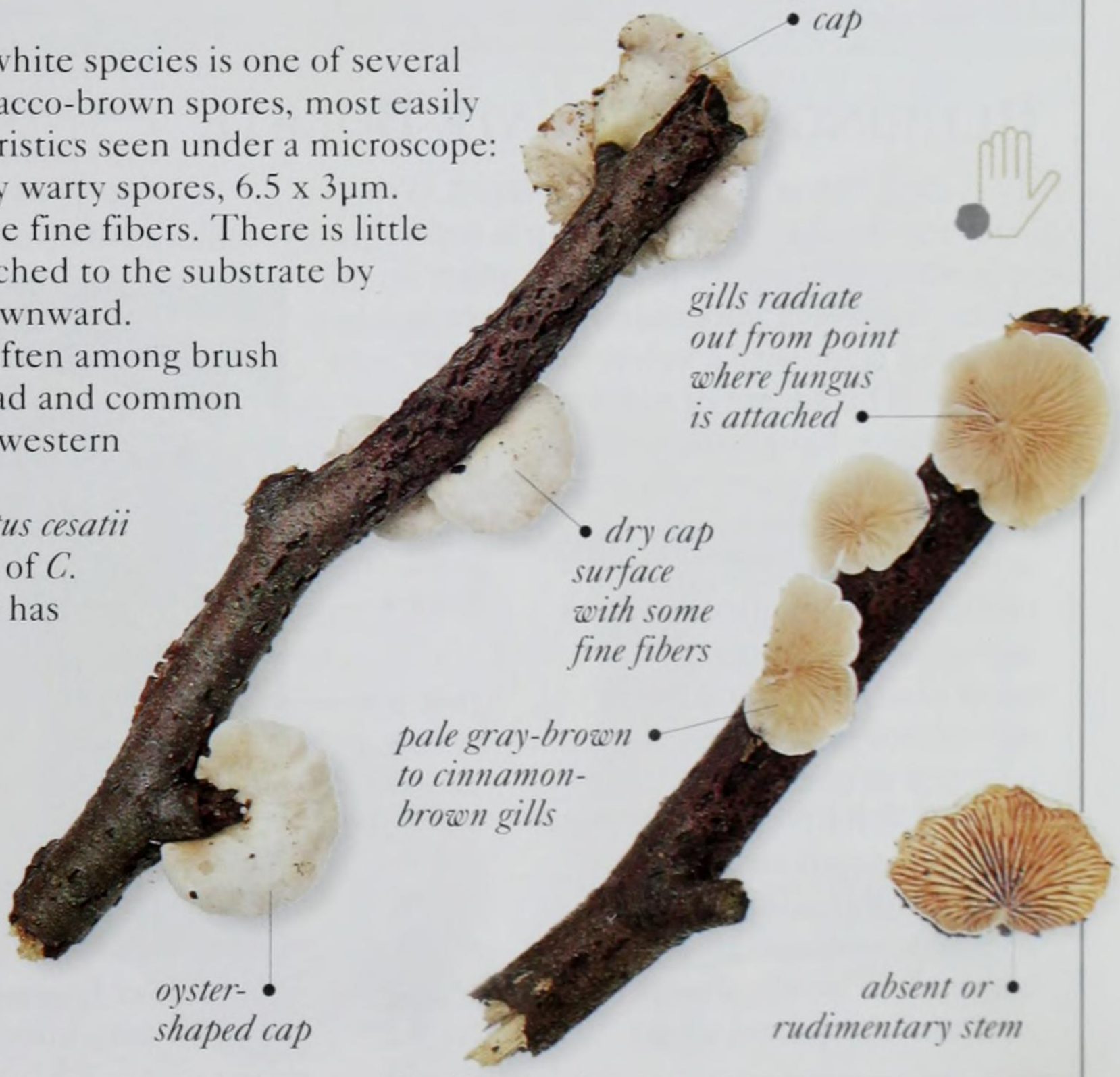
This small, oyster-shaped, off-white species is one of several similar mushrooms, all with tobacco-brown spores, most easily distinguished by spore characteristics seen under a microscope: it has oblong-ellipsoid, minutely warty spores, 6.5 x 3µm. The cap surface is dry with some fine fibers. There is little or no stem; the cap is often attached to the substrate by its back, with the gills facing downward.

• **OCCURRENCE** On sticks, often among brush piles in damp woods. Widespread and common in northern temperate zones in western North America.

• **SIMILAR SPECIES** *Crepidotus cesatii* has more rounded spores; those of *C. inhonestus* are smooth. *C. luteolus* has a yellow flush on the cap.



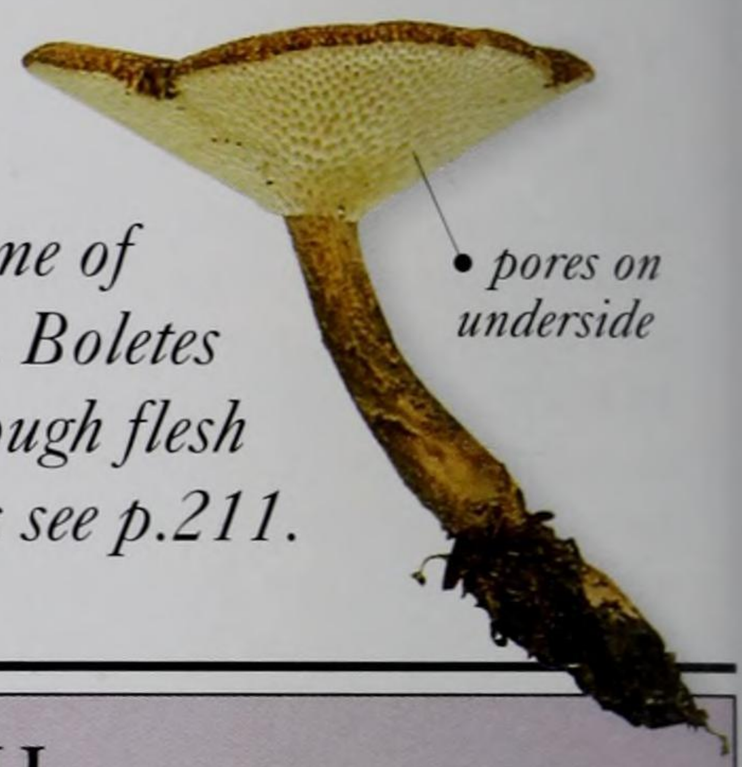
FRUITING Singly or in tiers on rotten deciduous trunks.



Dimensions CAP ⟷ 0.5–3cm	Spores Tobacco-brown	Edibility

CAP & STEM FUNGI WITH PORES

This section consists of fungi that produce spores in crowded tubes. The spores are released through pores on the fruitbody underside. Some of these fungi look similar to agarics (see p.10). Boletes have soft flesh (see below). Polypores have tough flesh (see p.202). For bracketlike fungi with pores see p.211.



WITH SOFT FLESH

THE MUSHROOMS in this subsection are known as boletes. They all have fairly short-lived fruitbodies, characterized by their soft, firm flesh, combined with pores on the underside of the cap. The fruitbodies of many of the species that belong here are attractive as food to a wide range of animals, including humans.

All of the boletes form mutually beneficial (mycorrhizal) associations with trees (see pp.18–19).

Family BOLETACEAE	Species *Porphyrellus porphyrosporus*	Season Summer–autumn

BLUEING CHOCOLATE BOLETE

This dark bolete is well camouflaged in its litter-rich habitat. Its convex cap is sepia colored with a velvety-textured surface, which may crack into scales; the stem is the same color with a velvety to smooth surface. The adnate or notched tubes, 1–2cm long, have wine-buff pores that become blue-green or black when bruised or otherwise damaged. The pale-colored flesh smells and tastes unpleasant; on cutting, it turns blue, green, black, or sometimes red. It has been reported as poisonous.

• OCCURRENCE Mycorrhizal with deciduous trees, such as beech, and conifers. As a complex, widespread and common to locally absent in northern temperate zones.

FRUITING Appears singly or in troops of fruitbodies, often in deep litter in woodland areas.

Dimensions CAP ⇹ 5–15cm | STEM ↕ 5–12cm ↔ 1–3cm	Spores Purple-brown	Edibility

Family BOLETACEAE	Species *Strobilomyces floccopus*	Season Summer–autumn

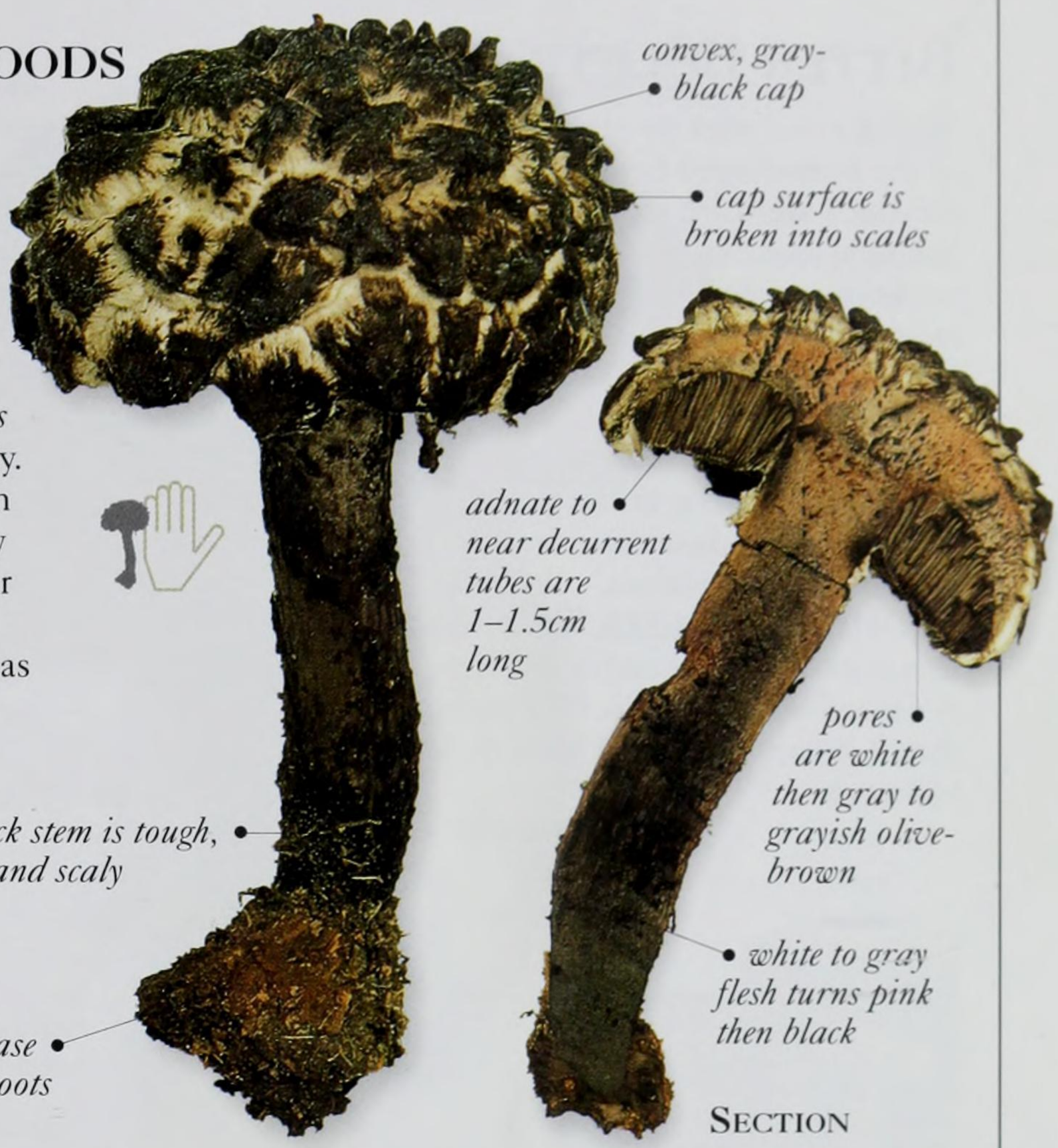
OLD MAN OF THE WOODS

The convex cap of this unusual bolete has a scaly, gray-black and white surface resembling a pine cone. It has a tough, fibrous, scaly, gray-black stem and tough flesh that stains pink then black when cut. The pores are rounded to angular. Also known as *S. strobilaceus* and placed by some in its own family.

• **OCCURRENCE** Grows with both conifers and deciduous trees, mostly on fertile soil. Widespread but rather local in northern temperate zones.

• **SIMILAR SPECIES** *S. confusus* has erect scales on its cap.

FRUITING Often appears singly or in small groups.



Dimensions CAP ⟷ 5–10cm | STEM ↕ 8–16cm ↔ 1–2cm	Spores Purplish black	Edibility

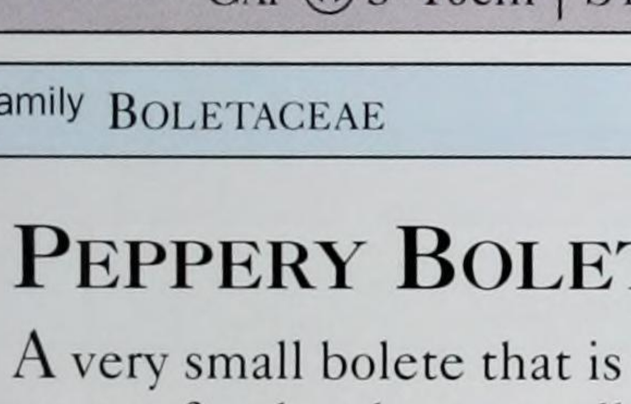
Family BOLETACEAE	Species *Chalciporus piperatus*	Season Summer–autumn

PEPPERY BOLETE

A very small bolete that is cinnamon-brown throughout, except for the chrome-yellow stem flesh; it does not stain blue on bruising. The slightly greasy cap is convex in shape, and the stem is slender; the tubes are 0.3–1cm long. The flesh has an intensely hot and peppery flavor, making this species inedible, although it has been used as a spice.

• **OCCURRENCE** Mycorrhizal with trees. Widespread throughout northern temperate zones.

• **SIMILAR SPECIES** *Chalciporus piperatoides* is similar but can be distinguished by the blue bruising of its cap, tubes, and pores. *C. amarellus* has pinker coloring and a less peppery taste.



FRUITING Mostly a few together or singly.

Dimensions CAP ⟷ 3–5cm | STEM ↕ 4–6cm ↔ 0.3–1cm	Spores Rusty brown	Edibility

Family BOLETACEAE	Species *Tylopilus felleus*	Season Summer–autumn

BITTER BOLETE

Slightly to distinctly pink pores on the underside of the bun-shaped brown cap and a dark net on the thick stem are characteristic of this bolete. It has soft, white to cream flesh with an unpleasant smell and a taste that is too bitter to make it edible (see also SIMILAR SPECIES).

• **OCCURRENCE** Mycorrhizal with conifers and deciduous trees on acidic soil. Widespread and common in eastern North America.

• **SIMILAR SPECIES** When young this is easily mistaken for the King Bolete, *Boletus edulis* (p.187) except that it is very bitter and has a dark stem net.

FRUITING Singly or in troops on well-drained, acidic soil.

Dimensions CAP ⇔ 6–15cm | STEM ↕ 5–12cm ↔ 2.5–5cm	Spores Dingy pink	Edibility

Family BOLETACEAE	Species *Boletus barrowsii*	Season Summer

BARROW'S BOLETE

This species has a convex to flat, white to gray or tan cap with pores that are white when young, aging to yellowish green. The tube layer, 2–3cm deep, is adnate to slightly depressed around the club-shaped stem, which is white with a distinctive off-white net pattern. The white flesh is thick and tastes sweet.

• **OCCURRENCE** Mycorrhizal with both conifers and deciduous trees. Widespread and common in North America; not found in Europe.

• **SIMILAR SPECIES** *Boletus edulis* (p.187) and closely related boletes have the white net patterning but darker caps.

FRUITING Appears in large groups of fruitbodies, or scattered under conifers and deciudous trees.

Dimensions CAP ⇔ 7.5–25cm | STEM ↕ 10–25cm ↔ 2–4cm	Spores Olive-brown	Edibility

Family BOLETACEAE	Species *Boletus edulis*	Season Summer–autumn

KING BOLETE

Widely known as cepe, porcini, steinpilz, and belyigrib, this bolete has a white net pattern on the upper stem and pale yellow to olive-brown pores. It has a bun-shaped, pale or dark brown cap, and a barrel-shaped stem. Its white, nonstaining flesh is pleasant-smelling and tastes mild and nutty.

• **OCCURRENCE** Mycorrhizal with trees in moss-rich woods. As a complex, widespread in northern temperate zones.

• **SIMILAR SPECIES** *Boletus variipes* has a dry, tan cap and grows with oak; *Tylopilus felleus* (p.186) is similar when young but tastes bitter.

smooth, slightly greasy cap surface

bun-shaped brown cap

skin slightly overhanging cap margin

white net of veins on upper stem

fine, rounded, white to yellow pores

notched tubes

tubes, 1–4cm long, mature olive-brown and are easily loosened

white flesh may have maggot holes or yellow staining from the parasite Sepedonium chrysospermum *(inset, right)*

SECTION

FRUITING Singly or in troops on well-drained soil.

△ *BOLETUS PINOPHILUS*
This rich brown species is found under pine. It has a pale stem net. The cap surface is slightly sticky; it dries felty or granular, often with distinct wrinkles.

△ *SEPEDONIUM CHRYSOSPERMUM*
A parasite of boletes, this species appears first as a white mold, becoming powdery golden yellow due to the asexual spores.

Dimensions CAP ⊕ 10–25cm | STEM ↕ 10–20cm ↔ 3–10cm	Spores Olive-brown	Edibility

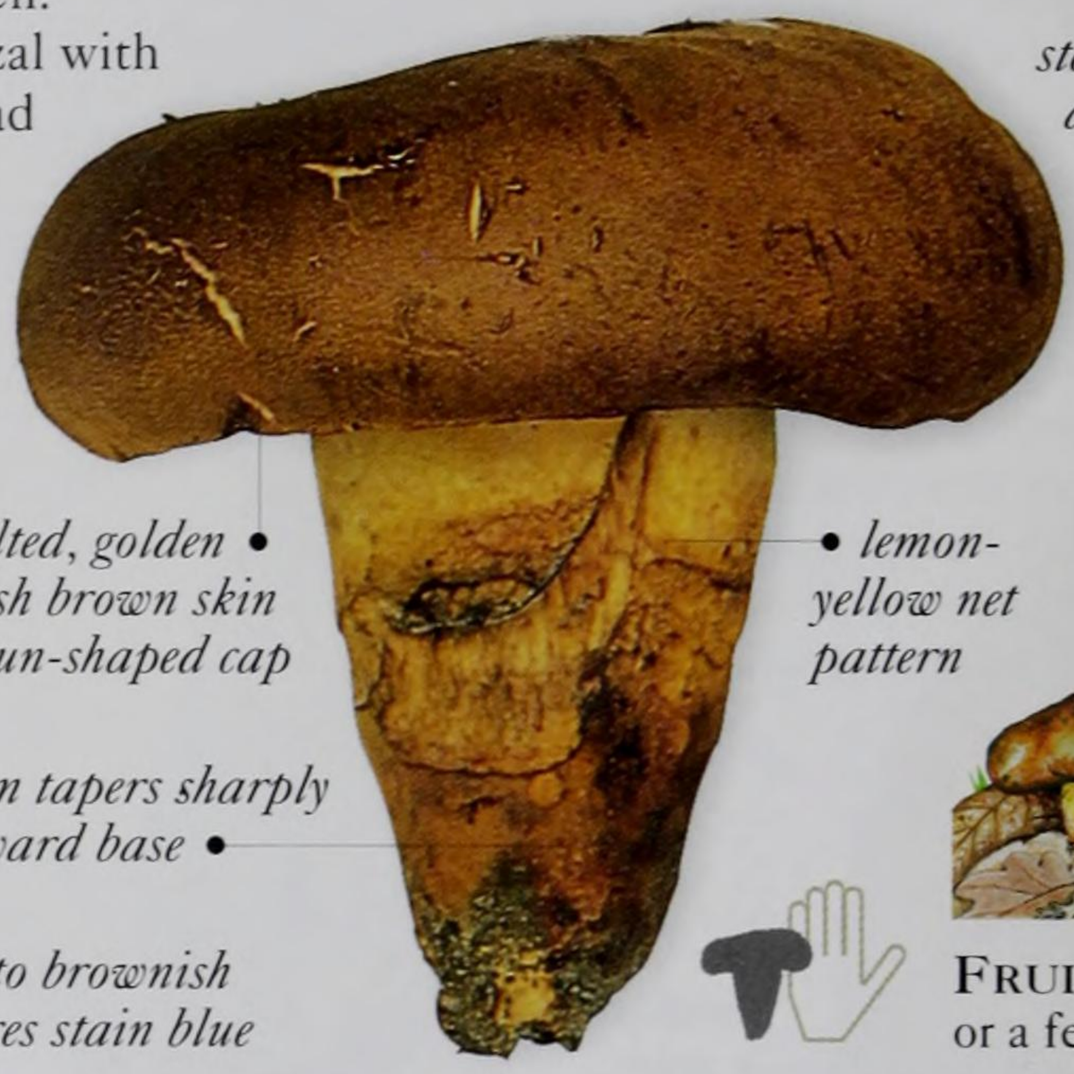
Family BOLETACEAE	Species *Boletus appendiculatus*	Season Summer–autumn

SPINDLE-STEMMED BOLETE

The tubes of this species are vivid lemon-yellow, aging to brownish yellow and staining blue; the stem net pattern is similar in color. The tapering stem is often rooting. A choice edible, it has firm, pale yellow to rusty flesh, which stains slightly blue, and a faint, pleasant smell.

• **OCCURRENCE** Mycorrhizal with oak trees in woods. Widespread in southern Europe; reported in California.

• **SIMILAR SPECIES** The cap of *Boletus radicans* is paler with a stouter stem.



SECTION

FRUITING Appears singly or a few together.

Dimensions CAP ⇹ 8–20cm | STEM ↕ 7–15cm ↔ 2.5–6cm	Spores Olive-brown	Edibility

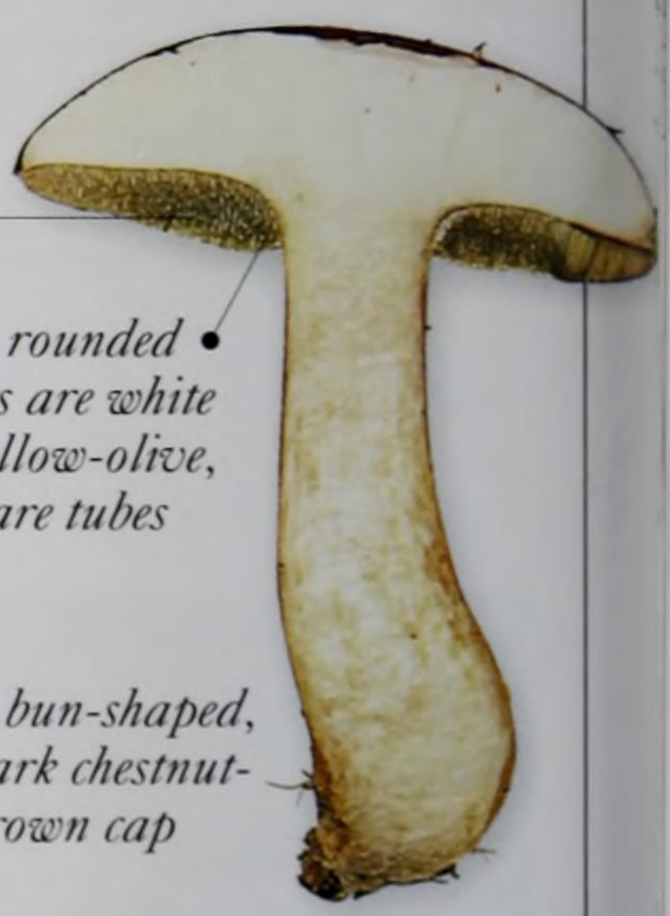
Family BOLETACEAE	Species *Boletus badius*	Season Late autumn

BAY BOLETE

The bun-shaped cap of this species is smooth, rather greasy, and dark chestnut-brown with white to yellow-olive pores, which stain blue. The cylindrical stem is brown without a net pattern. It is easiest to find in late autumn when other boletes are less common. Staining on the white flesh disappears with cooking.

• **OCCURRENCE** Mycorrhizal with pine; also found with deciduous trees. As a complex, widespread and common in eastern North America.

• **SIMILAR SPECIES** *Boletus edulis* (p.187) has a barrel-shaped stem with net patterning.



SECTION

FRUITING Singly or in scattered groups in woods.

Dimensions CAP ⇹ 4–15cm | STEM ↕ 4–12cm ↔ 1–4cm	Spores Olive-brown	Edibility

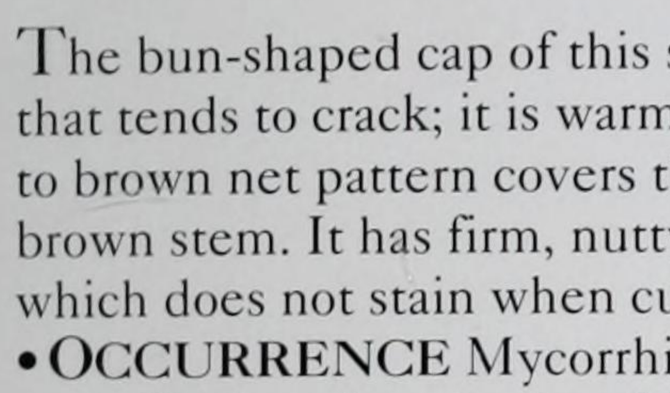
Family BOLETACEAE	Species *Boletus reticulatus*	Season Summer–autumn

SUMMER BOLETE

The bun-shaped cap of this species has a dry, matte skin that tends to crack; it is warm orange-brown. A white to brown net pattern covers the barrel-shaped, pale brown stem. It has firm, nutty-flavored white flesh, which does not stain when cut.

• **OCCURRENCE** Mycorrhizal with deciduous trees like beech and oak; with *Boletus luridiformis* (below) in some areas. Widespread in northern temperate zones; absent in North America.

• **SIMILAR SPECIES** *B. edulis* (p.187) has a darker cap and a less extensive, paler stem net.



△ *BOLETUS AEREUS*
A late-fruiting, brown species, reported in California, this has a velvety cap and a pale stem net. The flesh stays white. 🍽

SECTION

FRUITING In troops or a few together in woodland.

Dimensions CAP ⟷ 7–15cm | STEM ↕ 6–15cm ↔ 2–5cm	Spores Olive-brown	Edibility 🍽

Family BOLETACEAE	Species *Boletus luridiformis*	Season Summer–autumn

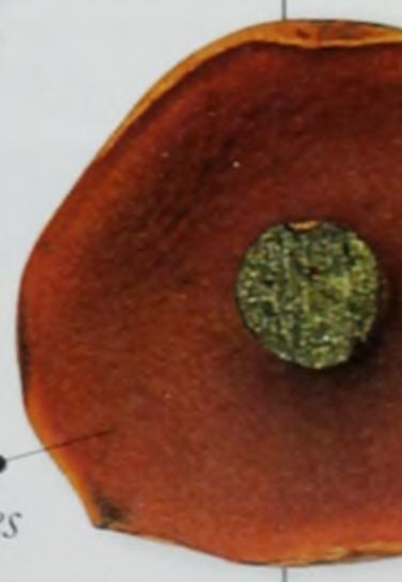
DOTTED-STEM BOLETE

Belonging to the group of boletes whose flesh turns blue when cut, this choice edible has a bun-shaped, dark brown cap with deep blood-red pores and yellow tubes. The yellow stem is densely covered with red dots and has no net pattern.

• **OCCURRENCE** Mycorrhizal with trees, in well-drained, mostly acidic and moss-rich, woodland soil. Widespread and common in Europe; not reported from North America.

• **SIMILAR SPECIES** *Boletus erythropus* and *B. subvelutipes* are two nearly indistinguishable species reported from North America. *B. luridus* (p.190) has a stem net.

SECTION



FRUITING Singly or a few fruitbodies together.

Dimensions CAP ⟷ 5–20cm | STEM ↕ 5–15cm ↔ 2–6cm	Spores Brown to olive-brown	Edibility 🍽

Family BOLETACEAE	Species *Boletus calopus*	Season Summer–autumn

SCARLET-STEMMED BOLETE

The skin on the bun-shaped cap of this bolete overhangs the margin and is felted, somewhat veined, and smoky gray or gray-brown. The cylindrical, barrel-shaped, or tapered stem is red at the base, yellow toward the top. It has a pale yellow net pattern, which is pale yellow above, darker and redder toward the base. The inedible, and possibly slightly poisonous flesh tastes bitter and is pale yellow, staining pale blue.

• **OCCURRENCE** Mycorrhizal with trees on acidic, sandy soil. Widespread but mostly local in northern temperate zones; not reported from North America.

• **SIMILAR SPECIES** Two similar bitter boletes, which can be found under conifers in western North America, both with blue-staining yellow pores, are *B. frustosus* and *B. conferarum*.

△ *BOLETUS LURIDUS*
This species has a prominent, orange-red stem net and lemon-yellow flesh that turns blue-black, as do the orange pores. There is a red line above the tube layer. 🍽

△ *BOLETUS BICOLOR*
A common summer species in eastern North America, this bolete has a bright rose-red cap and stem, and yellow pores. Its thick yellow flesh slowly bruises to blue. 🍽

FRUITING Appears singly or in troops under trees.

Dimensions CAP ⇔ 6–14cm | STEM ↕ 6–10cm ↔ 3–5cm	Spores Olive-brown	Edibility 🍽

Family BOLETACEAE	Species *Boletus satanas*	Season Summer–early autumn

SATAN'S BOLETE

A fleshy species with a bun-shaped, smooth, pale, almost white cap, Satan's Bolete is best identified by its orange to blood-red pores and the prominent yellow to blood-red net pattern on its fat, yellow to red stem. The yellow to white flesh stains slightly blue, as do the pores. The notched tubes, 1–3cm long, are yellowish green. Mature fruitbodies smell unpleasant and taste mild but are poisonous, causing gastrointestinal problems.

• **OCCURRENCE** Mycorrhizal with deciduous trees. Widespread in southern Europe; reported in California.

yellow to red stem with net pattern • *smooth cap is pale, almost white* •

FRUITING Singly, a few together, or in troops with trees such as beech and oak.

Dimensions CAP ⊕ 10–25cm | STEM ↕ 5–15cm ↔ 4–12cm	Spores Olive-brown	Edibility ☠

Family BOLETACEAE	Species *Boletus pulcherrimus*	Season Late summer–autumn

PRETTY POISON BOLETE

This brightly colored species is easily recognizable by its blood-red pores that turn blue-black when they are bruised; its bun-shaped, felted, reddish to olive-brown cap; its firm yellow flesh, which turns blue on cutting; and its swollen, but not abruptly bulbous, reddish brown stem that has a dark red net pattern covering the upper part. The notched tubes are 0.5–1.5cm long and yellow-green.

• **OCCURRENCE** Mycorrhizal with tanbark oak, Douglas fir, and giant fir in mixed forests and woodland. Widespread on the west coast of North America and New Mexico. Not found in Europe.

stem is swollen and reddish brown • *bun-shaped cap with felty covering* •

FRUITING Appears singly or in troops in forests that consist of a mixture of trees.

Dimensions CAP ⊕ 7.5–25cm | STEM ↕ 7.5–15cm ↔ to 10cm	Spores Brown	Edibility ☠

Family BOLETACEAE	Species *Boletus legaliae*	Season Summer–early autumn

LE GAL'S BOLETE

This species belongs to a group of red-colored, net-stemmed boletes. It has a smooth, pink-orange cap and a similarly colored stem with red netting at the top. The pores are red, and the notched tubes are 1–2cm long. The off-white to pale yellow flesh bruises light blue; the stem base stains pale pink. It has a mild taste and smell but is poisonous.

• **OCCURRENCE** Mycorrhizal with deciduous trees, preferring calcareous soil. Widespread throughout much of southern Europe; not reported in North America.

• **SIMILAR SPECIES** The cap of *Boletus rhodoxanthus* is purple-orange.

pink-orange stem is swollen, with a net • *smooth, bun-shaped cap is pink-orange* •

FRUITING Appears singly or a few fruit-bodies together on alkaline soil.

Dimensions CAP ⊕ 5–15cm | STEM ↕ 8–16cm ↔ 2.5–5cm	Spores Olive-brown	Edibility ☠

Family BOLETACEAE	Species *Boletus pulverulentus*	Season Summer–autumn

MIDNIGHT BLUE BOLETE

When bruised, all parts of this distinctive bolete almost immediately turn dark blue. It has a convex, brown to red-brown cap with pointed, dull yellow pores on the underside. The red-dotted, yellow stem is comparatively thin. The slightly notched to slightly decurrent tubes are 0.5–1.5cm long and pale yellow to olive-yellow; the firm flesh is yellow. It has a mild taste but does not rate as a choice edible.

• **OCCURRENCE** Mycorrhizal with deciduous trees, often oak, on fertile soil. Widespread in northern temperate zones.

• **SIMILAR SPECIES** *Boletus luridiformis* (p.189) has a similar, but typically thicker, stem and has red pores. Its flesh turns blue when cut.

FRUITING Appears singly or a few fruitbodies together; rarely, it may occur in troops.

Dimensions CAP ⇔ 4–10cm | STEM ↕ 4–10cm ↔ 1–3cm	Spores Olive-brown	Edibility

Family BOLETACEAE	Species *Boletus chrysenteron*	Season Summer–autumn

RED-CRACKING BOLETE

One of the smaller, less fleshy boletes, this species has a convex, red-brown cap, with skin that tends to crack, revealing a red layer. The thin, cylindrical, yellow to red stem is streaked but lacks distinct patterning. The angular, yellow to olive pores bruise faintly blue; the pale flesh hardly blues at all. It is edible but bland.

• **OCCURRENCE** Mycorrhizal with deciduous trees, often beech, on well-drained, humus-rich soil formed under acidic conditions. Widespread and common in parts of northern temperate zones; under conifers in California.

• **SIMILAR SPECIES** *B. truncatus* has an abruptly tapering stem and truncated spores.

△ ***BOLETUS POROSPORUS***
This bolete has a white-cracked brown cap and lemon-yellow flesh, pores, and tubes that stain blue. It is best identified by its truncated, spindle-shaped spores, 13 x 5µm

FRUITING Often in large troops but also singly.

Dimensions CAP ⇔ 3–10cm | STEM ↕ 3–10cm ↔ 0.5–2cm	Spores Olive-brown	Edibility

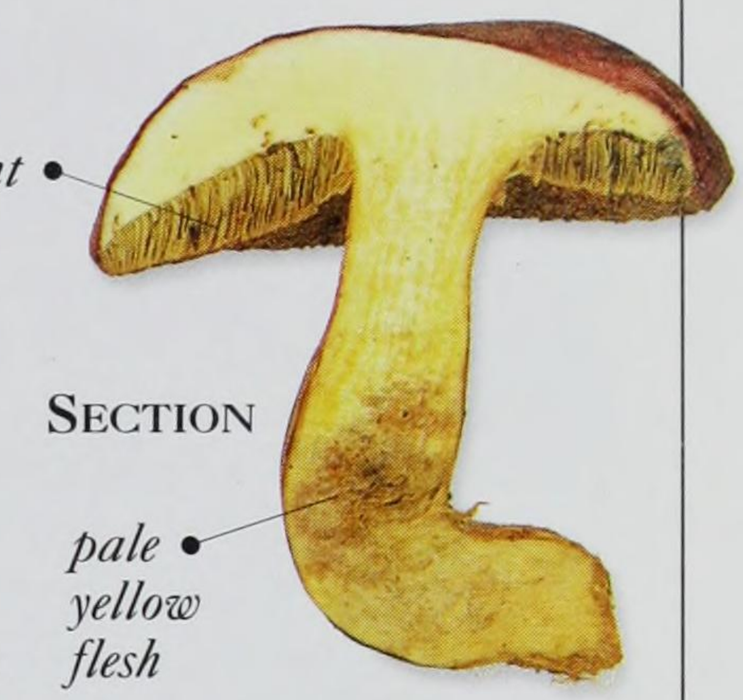
Family BOLETACEAE	Species *Boletus rubellus*	Season Summer–autumn

RED-CAPPED BOLETE

A small species with a deep red cap and stem. The cap is convex; the stem may have a thickened, pointed base. The yellow-olive pores stain blue when bruised; the yellow tubes are 0.5–1cm long. It has slowly blue-staining, pale yellow flesh. It is often placed in the genus *Xerocomus* with similar colored species as *Boletus chrysenteron* (p.192).

• **OCCURRENCE** Mycorrhizal with deciduous trees in grass, open woods, and parks. Widespread but local in northern temperate zones.

• **SIMILAR SPECIES** Although eaten in Europe, it is not a safe edible in North America.



FRUITING Mostly in troops of fruitbodies.

Dimensions CAP ⊕ 3–6cm | STEM ↕ 3–8cm ↔ 0.5–1cm	Spores Olive-brown	Edibility

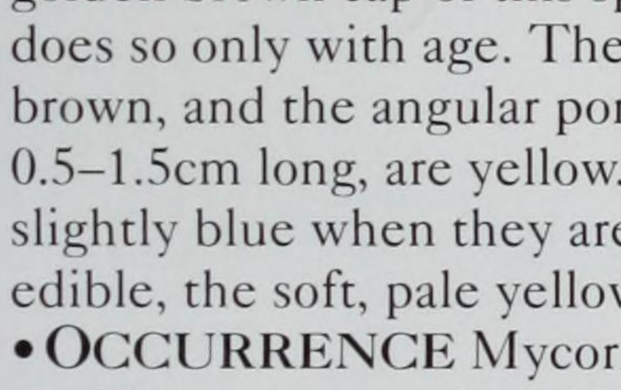
Family BOLETACEAE	Species *Boletus subtomentosus*	Season Summer–autumn

YELLOW-CRACKING BOLETE

Despite its common name, the surface of the golden brown cap of this species rarely cracks or does so only with age. The stem is also golden brown, and the angular pores and the tubes, 0.5–1.5cm long, are yellow. The pores stain slightly blue when they are bruised. Although edible, the soft, pale yellow flesh tastes bland.

• **OCCURRENCE** Mycorrhizal with both deciduous trees and conifers. Widespread and fairly common in northern temperate zones, extending into subarctic and alpine regions.

• **SIMILAR SPECIES** *B. chrysenteron* has a reddish brown cap that cracks to reveal a red underlayer. *B. pruinatus* is smaller.



FRUITING Singly or a few fruitbodies together.

Dimensions CAP ⊕ 6–10cm | STEM ↕ 6–10cm ↔ 1–2.5cm	Spores Olive-brown	Edibility

Family BOLETACEAE	Species *Boletus parasiticus*	Season Summer–autumn

EARTH-BALL BOLETE

An unusual habitat helps to distinguish this small bolete (see OCCURRENCE). Fairly uniformly ocher-brown all over, with no blue-staining reaction, it has a convex cap and a thin stem. The yellow to ocher tubes are 3–7mm long and decurrent. The flesh is pale yellow. Its is not recommended as an edible because its host is toxic.

• **OCCURRENCE** Mycorrhizal with deciduous trees, it grows on the fruitbodies of the fungus *Scleroderma citrinum* (p.256), to which it does little or no damage. Widespread in Europe and reported in eastern North America.

FRUITING In clusters on *Scleroderma citrinum*.

Dimensions CAP ⟷ 2–7cm | STEM ↕ 3–6cm ↔ 0.8–1.5cm	Spores Olive-brown	Edibility

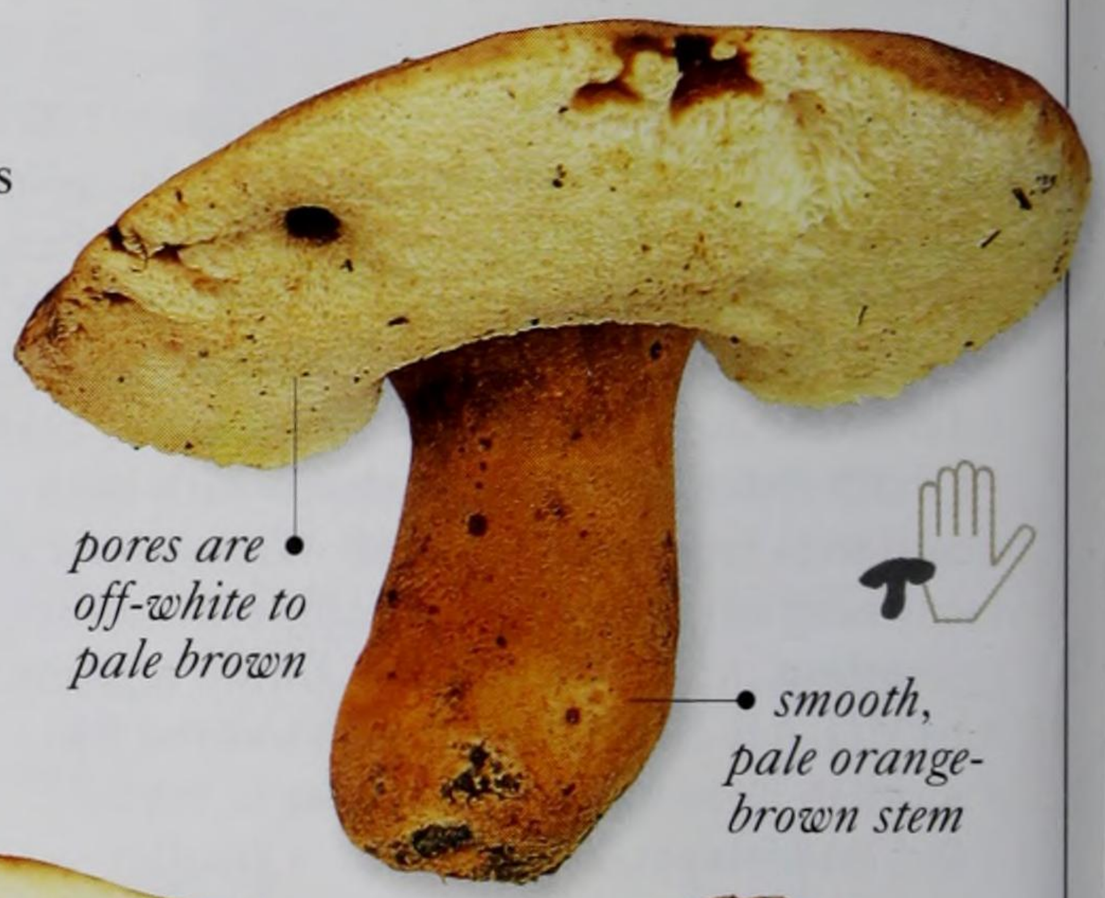
Family BOLETACEAE	Species *Gyroporus castaneus*	Season Summer–autumn

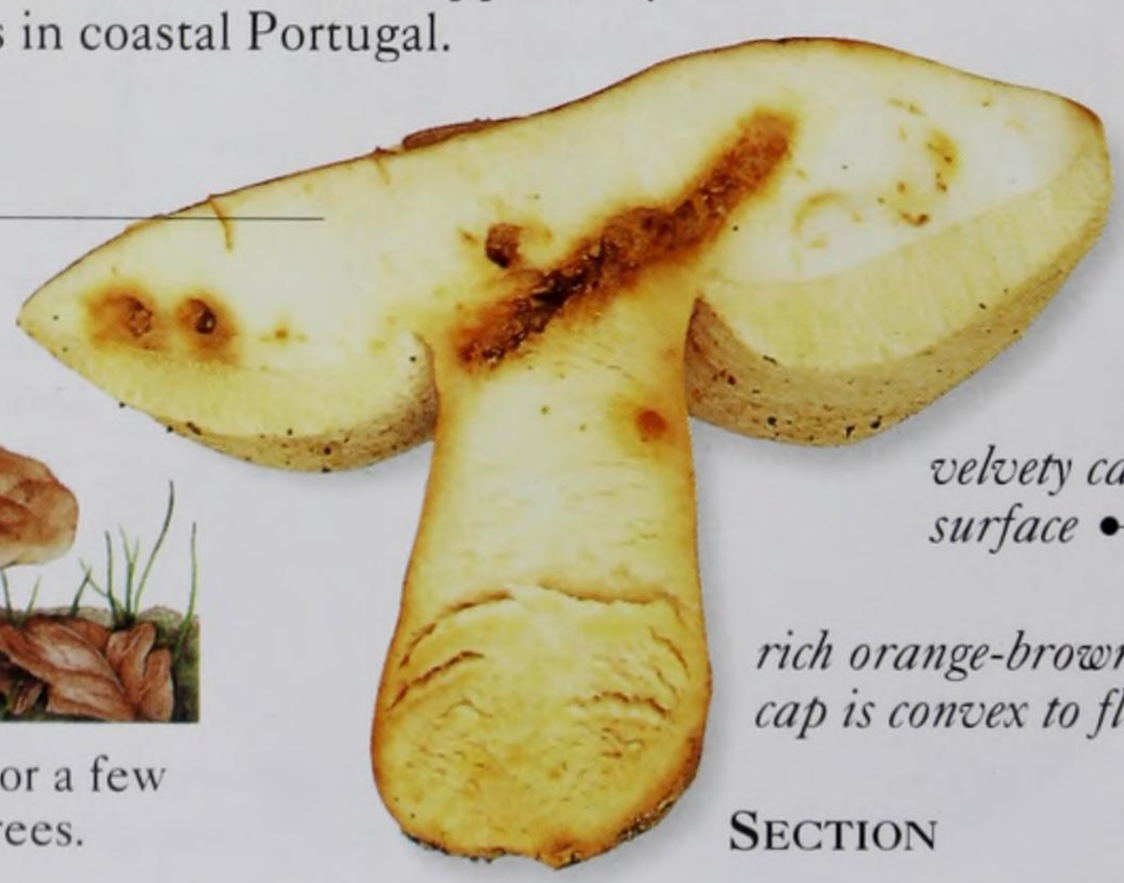
CHESTNUT BOLETE

As with all *Gyroporus* species, the Chestnut Bolete has pale spores; a fragile, chambered stem; and off-white to pale brown tubes, 3–6mm long, which are almost free. The convex to flat cap and smooth stem are a distinctive rich orange-brown. Its flesh, which does not stain when cut, tastes pleasantly nutty.

• **OCCURRENCE** Mycorrhizal with deciduous trees, especially oak, but also with pine. Often found on sandy soil. Widespread and locally quite common in northern temperate zones.

• **SIMILAR SPECIES** There is an apparently poisonous species in coastal Portugal.





FRUITING Singly or a few under deciduous trees.

SECTION

Dimensions CAP ⟷ 3–8cm | STEM ↕ 4–7cm ↔ 1–3cm	Spores Pale yellow	Edibility

Family BOLETACEAE	Species *Gyroporus cyanescens*	Season Summer–autumn

BLUEING CHAMBERED BOLETE

The most distinctive feature of this species is revealed when it is cut or its tube layer is scratched – the off-white flesh and tubes turn greenish blue to indigo; other blue-staining boletes (mainly *Boletus* species) typically turn darker blue or even blue-black. Otherwise, it has the characteristic fragile flesh, almost free tubes, 5–10mm long, and chambered stem of the genus. It has small, rounded pores and a bulbous stem base that tapers abruptly to a point. A choice edible, it has a pleasantly nutty flavor.

• OCCURRENCE
Mycorrhizal with conifers and deciduous trees in woods. Widespread and locally common but rare in most northern temperate zones.

FRUITING Singly or a few together on sandy soil.

Dimensions CAP ⟷ 5–8cm | STEM ↕ 6–10cm ↔ 2–3cm	Spores Pale yellow	Edibility

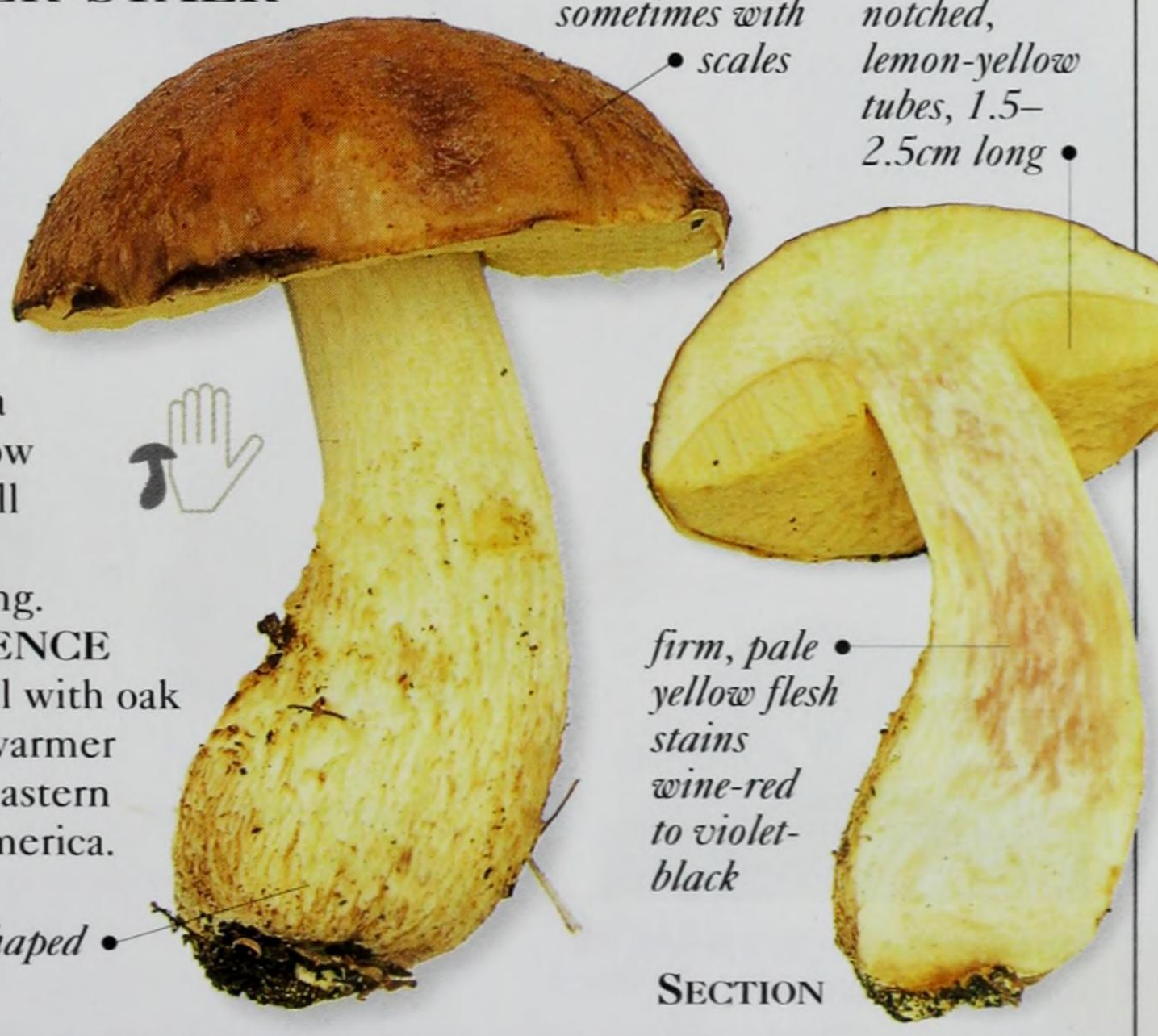
Family BOLETACEAE	Species *Leccinum crocipodium*	Season Summer–autumn

YELLOW-PORED SCABER-STALK

The yellow coloring of this fungus is unusual among species in the *Leccinum* genus, as is the cracking cap skin. The pores are ocher-yellow, staining lilac-brown, and the stem is yellow with ocher-yellow spotting, becoming net-like and brown toward the base; the bun-shaped cap is yellow-brown with a slightly velvety surface. The pale yellow flesh stains wine-red to violet-black. All species of *Leccinum* should be cooked thoroughly before eating.

• OCCURRENCE
Mycorrhizal with oak trees in warmer parts of eastern North America.

FRUITING Singly or a few together; prefers fertile soil.



Dimensions CAP ⟷ 4–10cm | STEM ↕ 5–12cm ↔ 1–3cm	Spores Olive-ocher	Edibility

Family BOLETACEAE	Species *Leccinum scabrum*	Season Summer–autumn

BROWN SCABER-STALK BOLETE

A brown cap with gray-white pores and a white to gray stem covered with gray-black scales are key identification marks of this species, which is treated in a broad sense here: distinguishing between it and its near relatives is difficult, and *Leccinum scabrum* is often used as a collective name for all brown-capped *Leccinum* species (see also *L. variicolor*, inset). The flesh is soft in the bun-shaped cap, fibrous in the club-shaped stem; unlike that of some relatives, it hardly stains. Although edible, it is not choice and, once gathered, does not keep well.

• **OCCURRENCE** Mycorrhizal with birch, often on damp ground. Widespread in eastern North America.

bun-shaped cap • is brown

slightly • overhanging skin on cap

sturdy, club-shaped stem •

• gray to black scales cover stem

• soft, gray-white to buff tubes, 1.5–2.5cm long, are notched

firm, fibrous • flesh in stem

SECTION

• color of flesh hardly changes at all when cut

FRUITING Singly, a few together, or in troops.

△ *LECCINUM VARIICOLOR*
This species has a mottled, sooty brown cap with white or cream pores. The base of the gray-scaled, white stem usually has a pale blue stain. The white stem flesh stains pink and turquoise; the cap flesh is pink with gray-white tubes. 🍽

Dimensions CAP ⇹ 6–15cm | STEM ↕ 10–20cm ↔ 1–3cm	Spores Ocher-brown	Edibility 🍽

Family BOLETACEAE	Species *Leccinum versipelle*	Season Summer–autumn

ORANGE SCABER-STALK BOLETE

A very handsome mushroom, this species, also known as *L. testaceoscabrum*, has a bun-shaped, orange cap contrasting with its tall, black-scaled, white stem; the cap skin overhangs the cap margin and has a finely felted surface. The pores vary from pale gray to ocher-gray, while the notched tubes, 1–3cm long, are dirty white. Staining gray-black, the firm, off-white flesh is reasonably tasty but lacks the quality of some of the *Boletus* species.

• **OCCURRENCE** Mycorrhizal with birch in damp woods. Widespread and common in northern temperate zones; north-eastern North America.

tubes are notched and dirty white to buff

gray-black staining on off-white flesh

SECTION

bun-shaped mature cap

pores may be pale gray to ocher-gray

cap skin overhangs cap margin

black scales cover tall stem

very dark stem of immature specimen

bright orange cap surface is finely felted

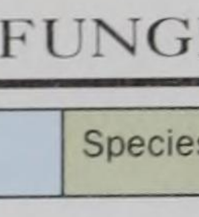
FRUITING Singly or a few fruitbodies together.

Dimensions CAP ⊕ 8–15cm | STEM ↕ 10–18cm ↔ 1.5–4cm	Spores Ocher-brown	Edibility

Family BOLETACEAE	Species *Leccinum quercinum*	Season Summer–autumn

EURO SCABER-STALK

This bolete belongs to a group of red-capped *Leccinum* species and is distinguished in the group by its mycorrhizal partner and by the reddish brown scales on the stem. Its bun-shaped cap is orange-brown, the pores are off-white to gray or olive-yellow, and its firm white flesh stains almost black. It makes a good edible.



• **OCCURRENCE**
Mycorrhizal with oak trees in forests. Widespread and common in some regions of northern temperate zones.

• **SIMILAR SPECIES**
L. aurantiacum has a more orange cap and is associated with aspen and poplar trees. *L. insigne* is common under aspens in the Rockies and has flesh that stains lilac-gray.

FRUITING Typically a few fruitbodies together.

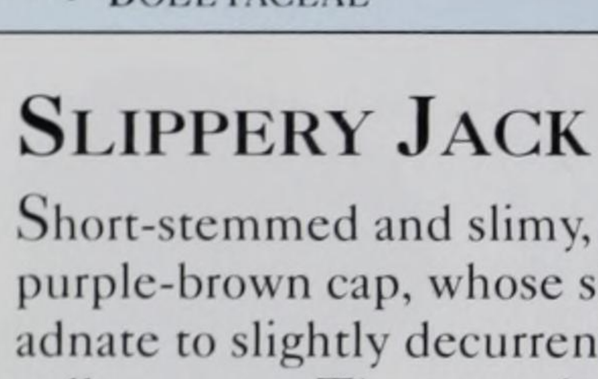
Dimensions CAP ⟷ 8–15cm | STEM ↕ 10–15cm ↔ 1.5–3cm	Spores Ocher-brown	Edibility 🍽

Family BOLETACEAE	Species *Suillus luteus*	Season Late summer–autumn

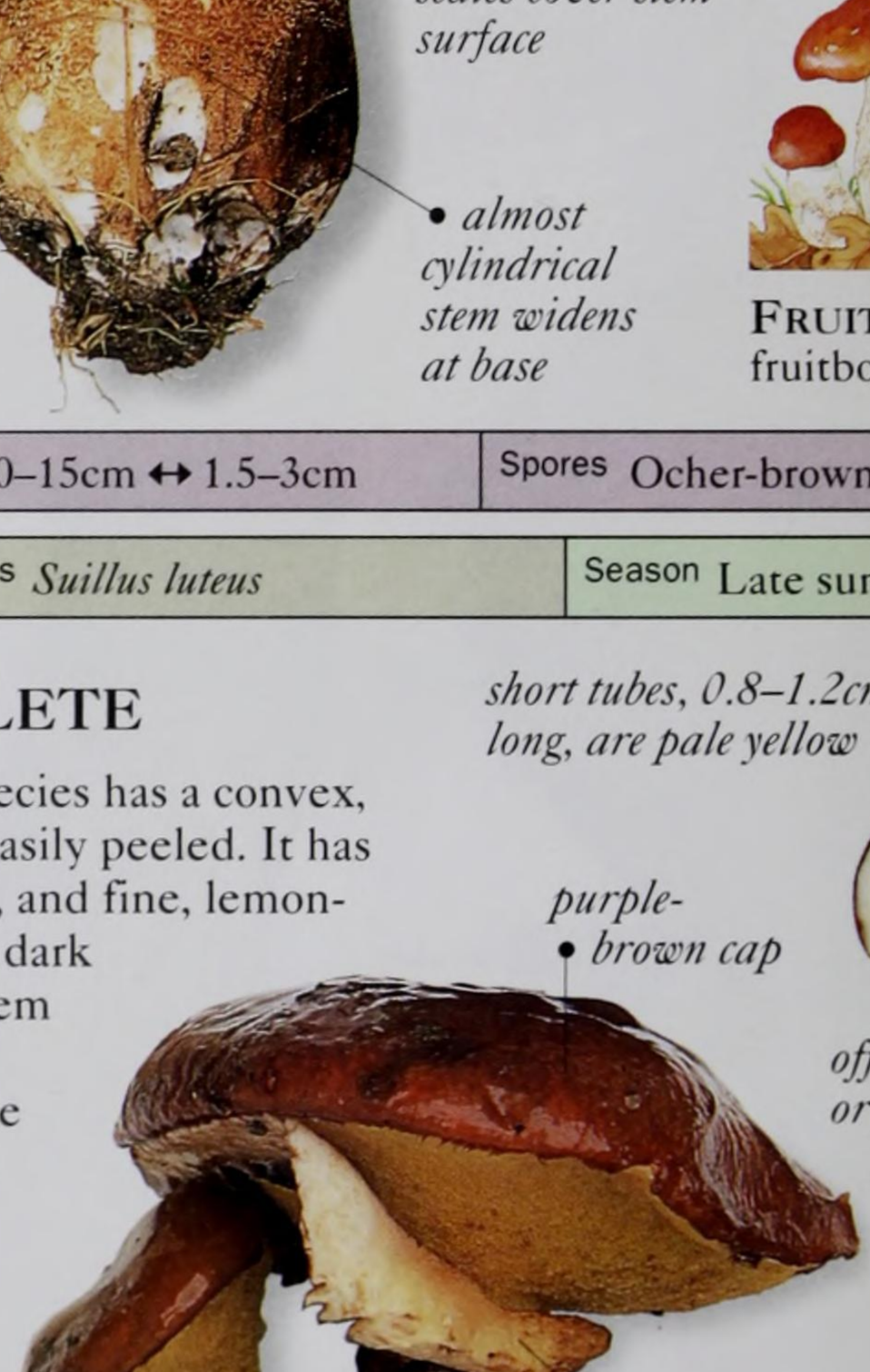
SLIPPERY JACK BOLETE

Short-stemmed and slimy, this species has a convex, purple-brown cap, whose skin is easily peeled. It has adnate to slightly decurrent tubes, and fine, lemon-yellow pores. The stem ring has a dark purple underside. Below it, the stem is white, aging purple; above, it is pale yellow with darker dots. Some people are allergic to this species.

• **OCCURRENCE** Mycorrhizal with pine trees. Widespread and common in eastern North America under two- and three-needled pine.



FRUITING Typically in troops under two-needled pine trees.



Dimensions CAP ⟷ 5–10cm | STEM ↕ 5–10cm ↔ 1.5–3cm	Spores Ocher-brown	Edibility 🍽

Family BOLETACEAE	Species *Suillus grevillei*	Season Autumn

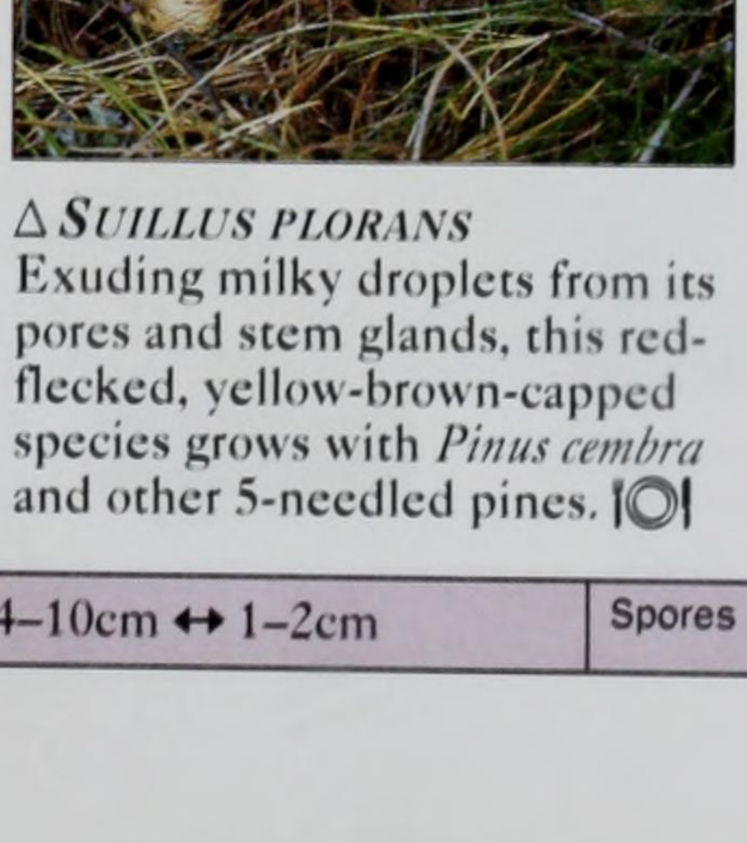
LARCH BOLETE

This vividly colored bolete has a convex, bright yellow to yellowish orange cap, which is very slimy, and lemon-yellow pores that bruise cinnamon-brown. The white and yellow ring near the top of the yellow-brown stem is also slimy. It is edible, without a distinctive flavor, and, when young, has firm yellow flesh that does not stain; the slimy cap skin is best peeled off when gathering for eating.

• OCCURRENCE
Mycorrhizal with larch trees in woods, stands, and gardens; may be found some distance from the host tree. Widespread and common in northern temperate zones.

SECTION

△ *SUILLUS AERUGINASCENS*
This dingy olive-brown species, found with larch, has a slimy cap with a white veil. Its off-white to gray-brown pores turn olive-green when bruised. 🍽



△ *SUILLUS PLORANS*
Exuding milky droplets from its pores and stem glands, this red-flecked, yellow-brown-capped species grows with *Pinus cembra* and other 5-needled pines. 🍽

FRUITING In troops near larch in grass and litter.

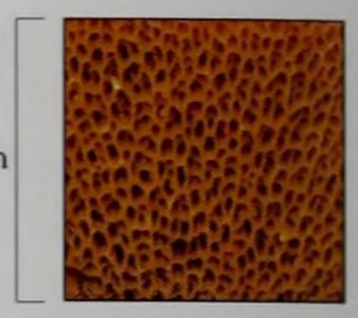
Dimensions CAP ⟷ 5–10cm | STEM ↕ 4–10cm ↔ 1–2cm	Spores Yellowish brown	Edibility 🍽

Family BOLETACEAE	Species *Suillus bovinus*	Season Late summer–autumn

EURO COW BOLETE

This usually small, orange-rusty brown bolete, with its convex to flat cap and short, ringless stem, is notable for its compound pores: the olive-green pore layer has an outer layer of coarse, angular pores and an inner layer of fine pores. The stem is often barely visible until the fruitbody is picked. The Euro Cow Bolete is edible, with soft, pink-flushed to brownish cream flesh, but it lacks flavor.

• **OCCURRENCE** Mycorrhizal with two-needled pine trees. Often found with *Suillus variegatus* (p.201) and *Gomphidius roseus* (p.38). Widespread and common in Europe and parts of Asia including Japan; absent in North America.



PORE SURFACE

compound pores are more or less olive-green

orange-rusty brown cap

cap greasy when wet

adnate-decurrent tubes are 0.3–1cm long and yellow to olive-yellow

FRUITING In troops, often with moss or on sandy soil.

Dimensions CAP ⇹ 3–7cm | STEM ↕ 3–6cm ↔ 0.5–1cm	Spores Brownish olive	Edibility

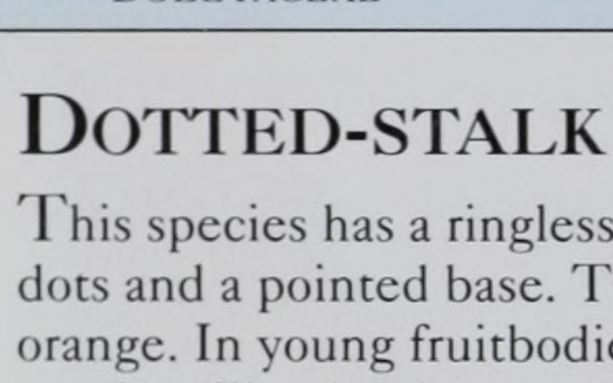
Family BOLETACEAE	Species *Suillus granulatus*	Season Late summer–autumn

DOTTED-STALK BOLETE

This species has a ringless stem with distinctive yellow dots and a pointed base. The cap is rusty brown to yellow-orange. In young fruitbodies, the fine, rounded pores exude milky droplets, as do the stem glands. The white to pale yellow flesh is firm with a mild, nutty flavor.

• **OCCURRENCE** Mycorrhizal with two-needled pine, on alkaline soil. Widespread in northern temperate zones.

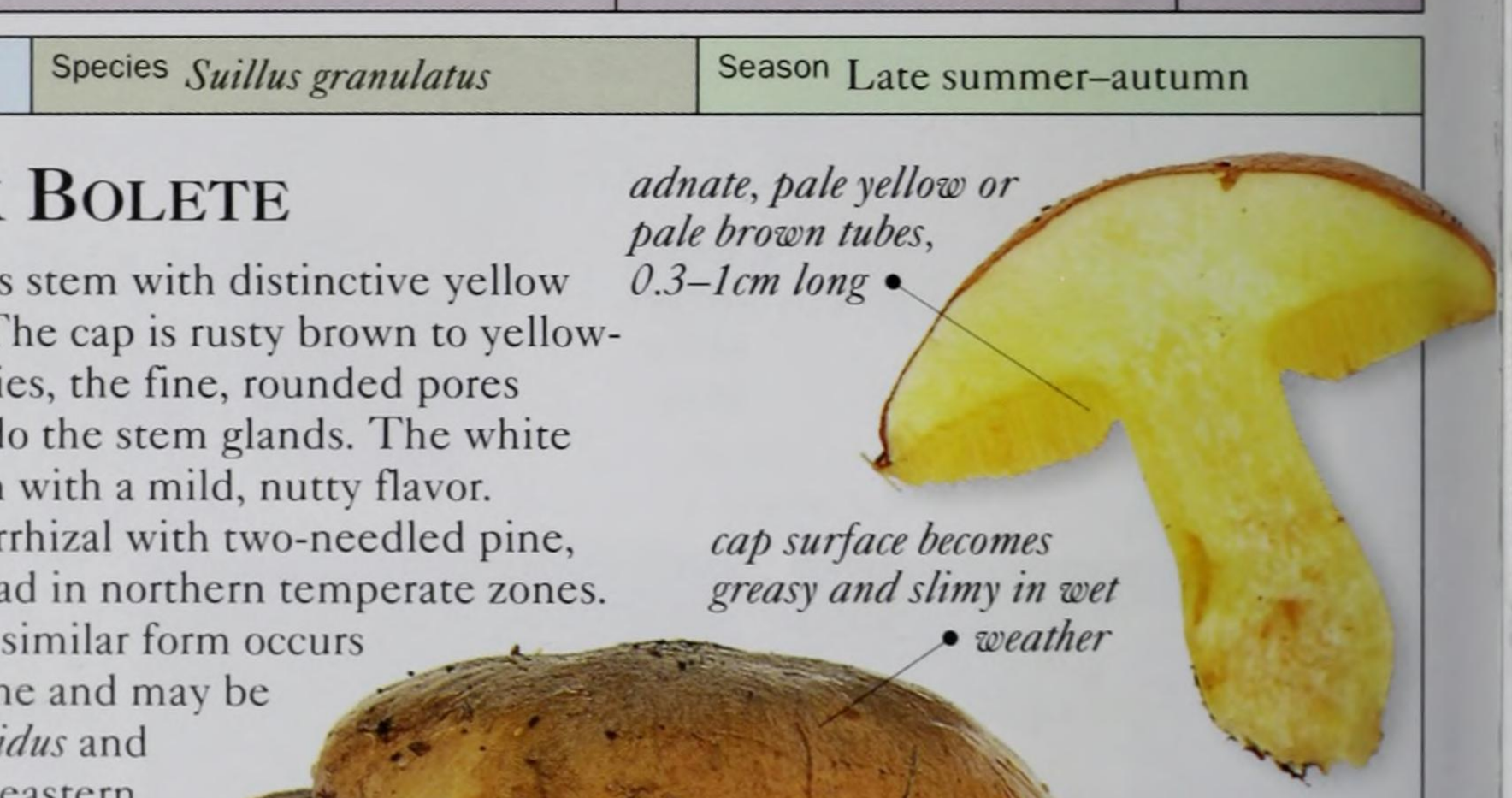
• **SIMILAR SPECIES** A similar form occurs under 5-needled white pine and may be a different species. *S. placidus* and *S. americanus* occur under eastern white pine; *S. sibiricus* under western white pine.



FRUITING In troops or a few together near pines.

adnate, pale yellow or pale brown tubes, 0.3–1cm long

cap surface becomes greasy and slimy in wet weather



SECTION

dry, shiny cap is convex to flat

pale yellow stem with yellow to red glands

fine, rounded yellow pores

Dimensions CAP ⇹ 4–10cm | STEM ↕ 4–8cm ↔ 1–1.5cm	Spores Pale brown	Edibility

Family BOLETACEAE	Species *Suillus variegatus*	Season Summer–autumn

VARIEGATED BOLETE

Tall-stemmed and fleshy, the Variegated Bolete rarely exhibits the sliminess that is characteristic of the genus *Suillus*. Its convex, orange-brown cap has a felty to finely scaly surface. The small pores are brown to olive-brown and, like the pale yellow flesh, stain blue when pressed. The stem is brown with olive-green or pale red tints. Although edible, it has a metallic smell and unpleasant taste.

• **OCCURRENCE** Mycorrhizal with two-needled pine trees, often found with heathers and other acid-loving plants, on sandy soil. Widespread and common in Europe and nearby parts of Asia.

• **SIMILAR SPECIES** *S. tomentosus* is the equivalent species in western North America.

FRUITING Appears a few together or in troops.

Dimensions CAP ⟷ 7–13cm | STEM ↕ 6–10cm ↔ 1.5–2cm	Spores Brownish olive	Edibility

Family BOLETACEAE	Species *Suillus spraguei*	Season Summer–autumn

PAINTED BOLETE

With its dry, scaly red cap, partial white veil, and large yellow pores, this species is very easily recognized. The cap is convex, and the red-flecked, yellow stem may be somewhat club-shaped. The partial veil, which covers the immature pores at first, leaves a cobweblike ring on the upper part of the stem. The tubes are adnate to slightly decurrent. The yellow flesh, which becomes pink tinged on exposure to air, has a firm texture and a mild taste.

• **OCCURRENCE** Mycorrhizal with eastern white pine (*Pinus strobus*) in woods and parks. Widespread and common in eastern North America, wherever eastern white pine grows.

FRUITING Appears in scattered fruitbodies or in large groups under eastern white pine trees.

Dimensions CAP ⟷ 3–12cm | STEM ↕ 4–12cm ↔ 1–2.5cm	Spores Olive-brown	Edibility

WITH TOUGH FLESH

THE MUSHROOMS in this subsection are known as polypores; they have pores on the cap underside and tough flesh. The polypores featured here also have a more or less distinct stem (for polypores with a bracketlike fruitbody and no stem, see pp.211–233).

Unlike the boletes (pp.184–201), the tube layer of polypores is not easy to separate from the flesh.

Family POLYPORACEAE	Species *Albatrellus ovinus*	Season Summer–autumn

SHEEP POLYPORE

From above, this creamy to pale gray-brown polypore looks like an agaric (see p.28) or a hedgehog mushroom (p.238), but it has minute pores on the underside. It stains lemon or greenish yellow, particularly on the pores. The skin of the convex cap often cracks with age. It has a sturdy stem and very firm, mild to slightly bitter white flesh.

• **OCCURRENCE** Under conifers, mycorrhizal with spruce on moss-covered soil. Widespread throughout northern temperate zones; locally common.

• **SIMILAR SPECIES** *Albatrellus confluens* is more orange and does not stain yellow; it tastes bitter. *A. subrubescens* stains orange.

FRUITING Appears in troops and groups under established stands of spruce trees.

Dimensions CAP ⇔ 7–18cm | STEM ↕ 3–7cm ↔ 1–3cm	Spores White	Edibility 101

Family POLYPORACEAE	Species *Polyporus umbellatus*	Season Summer–early autumn

UMBRELLA POLYPORE

This large, fleshy polypore has a single, multi-branched stem that supports many centrally stemmed, small, circular, pale gray to gray caps. The underside has angular pores, 1–3 per mm, which are white to pale yellow. A choice edible, it has firm, mild-tasting, white to cream flesh. Unlike most polypores, this species has a large black pseudosclerotium with an interior marbled black and white by a mixture of hyphae and earth.

• **OCCURRENCE** On the ground in open deciduous woods. Scattered in northern temperate zones.

• **SIMILAR SPECIES** The individual brackets of *Grifola frondosa* (p.216) do not have central stems.

FRUITING On the ground, springing from pseudosclerotium; appears in large clusters.

Dimensions CAP ⇔ 1–4cm | STEM ↕ 5–7.5cm ↔ 2–3cm	Spores White	Edibility 101

Family POLYPORACEAE	Species *Polyporus squamosus*	Season Late spring–summer

DRYAD'S SADDLE POLYPORE

A circular to fan-shaped bracket, covered with brown scales, a black stem positioned to one side, and a decurrent off-white to ocher tube layer, 0.5–1cm thick, make this mushroom unmistakable. Early in the season, it seems to explode out of half-dead trees or stumps; it becomes very large, but is soon devoured by a multitude of insects, leaving only a dried-up carcass, which is broken down by other fungi. The white flesh is soft and smells and tastes of watermelon rind. It can be eaten when very young.

• **OCCURRENCE** Parasitic or saprotrophic on deciduous trees in woods, on street trees, and in parks. Widespread and common in northern temperate zones.

PORE SURFACE

concentric, flattened brown scales on surface

brackets often united

white flesh becomes corky with age

decurrent, off-white to ocher tube layer

0.5–1 pore per mm on tube layer

short black stem at margin

SECTION

FRUITING Appears in clusters or singly.

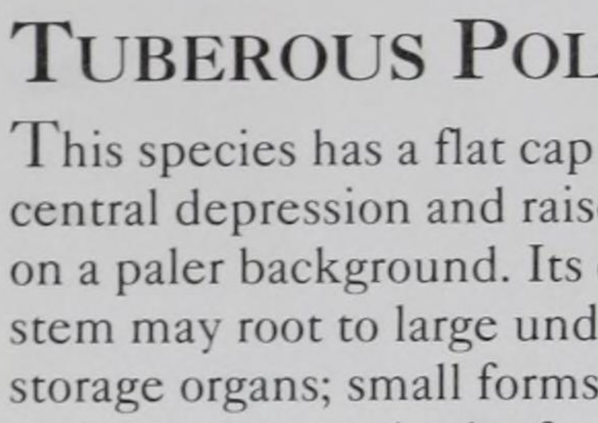
Dimensions BRACKET ↔ 10–60cm × 10–30cm ↕ to 5cm	Spores White	Edibility 101

Family POLYPORACEAE	Species *Polyporus tuberaster*	Season Late spring–autumn

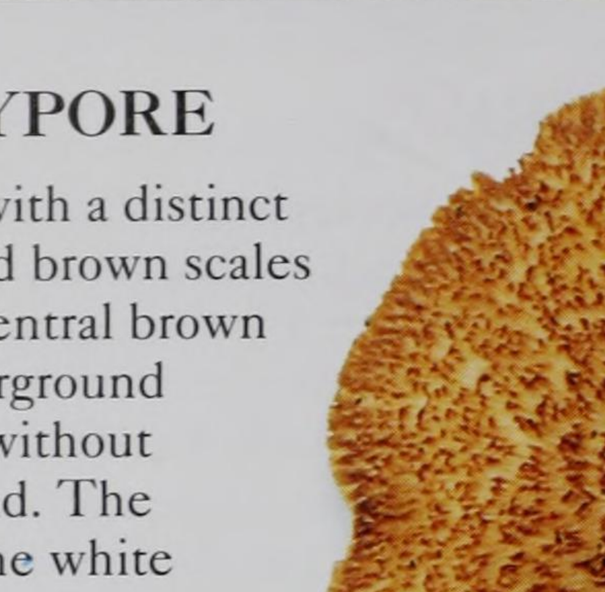
TUBEROUS POLYPORE

This species has a flat cap with a distinct central depression and raised brown scales on a paler background. Its central brown stem may root to large underground storage organs; small forms without such organs can also be found. The flesh is edible but tough. The white tubes are up to 5mm long.

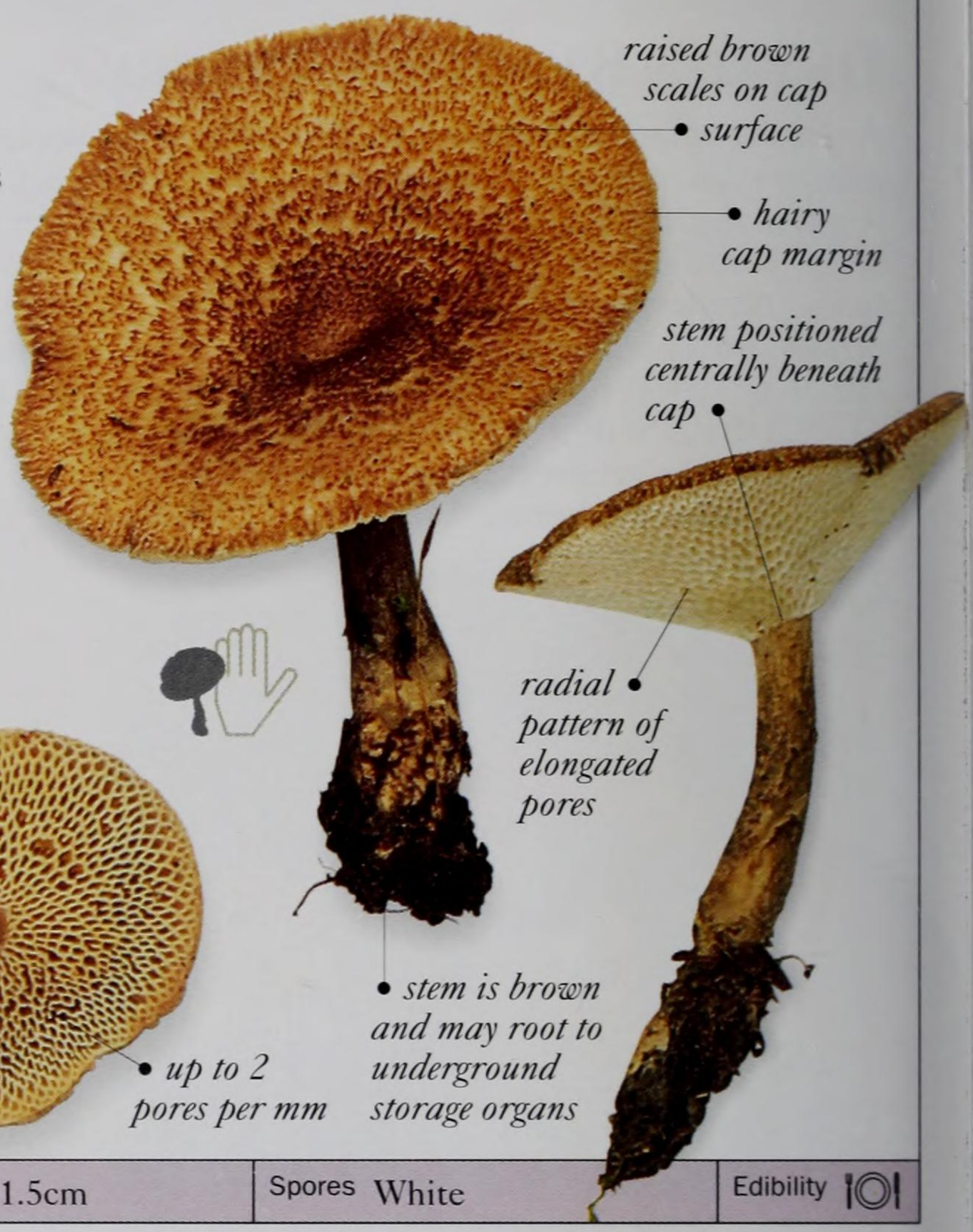
• OCCURRENCE In deciduous woods, often on calcareous soil; causes white-rot wood decay. Widespread but local in northern temperate zones; western North American in the aspen zone.



FRUITING Singly, often from underground storage organs.



up to 2 pores per mm



Dimensions CAP ⇹ 5–20cm | STEM ↕ to 8cm ↔ 1.5cm	Spores White	Edibility

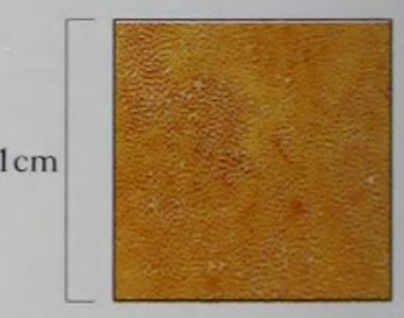
Family POLYPORACEAE	Species *Polyporus badius*	Season Late spring–autumn

LIVER-BROWN POLYPORE

This species has a smooth and shiny funnel-shaped cap, which is pale gray-brown when young, then rich dark chestnut with a bright orange-brown margin; in wet weather it is greasy. The short, gray-black stem is attached off-center or at the margin. There are 4–8 pores per mm, and the decurrent tube layer is 0.5–2mm thick. The white flesh is too tough to be edible.

• OCCURRENCE In damp woods, on deciduous trees causing white rot. Widespread, local to common in northern temperate zones.

• SIMILAR SPECIES *Polyporus melanopus* is rarer and has a felty cap surface. *P. squamosus* (p.203).



PORE SURFACE

FRUITING Singly or a few fruitbodies together.

Dimensions CAP ⇹ 5–20cm | STEM ↕ 2–4cm ↔ 0.5–2cm	Spores White	Edibility

Family POLYPORACEAE	Species *Polyporus varius*	Season Late spring–autumn

BLACK-FOOTED POLYPORE

The wavy-margined cap of this species is a uniform golden yellow to cinnamon-brown and smooth. The off-center stem becomes black with age, in contrast to the lighter cap, and the decurrent, white to pale cream tube layer is less than 1mm thick. The inedible, white to pale wood-brown flesh is tough with a faint mushroomy smell. Tiny forms with a central stem may be found.

• **OCCURRENCE** On a range of deciduous trees in woods and parks, causing a white rot. Widespread and common in northern temperate zones.

FRUITING A few together on dying deciduous wood.

Dimensions CAP ⇔ 3–12cm | STEM ↕ to 8cm ↔ 0.8–1.5cm	Spores White	Edibility

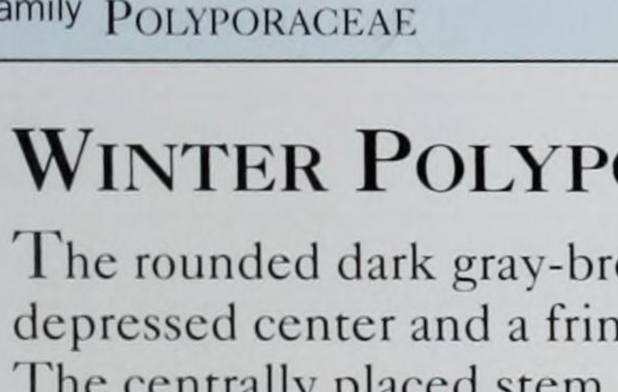
Family POLYPORACEAE	Species *Polyporus brumalis*	Season Late autumn–spring

WINTER POLYPORE

The rounded dark gray-brown cap of this tough species has a depressed center and a fringed margin, rolling inward when dry. The centrally placed stem is dark gray-brown, and the flesh is white. The white to cream tube layer, to 2mm thick, has large, circular pores that elongate as they mature. The fruitbodies do not develop until well into autumn; their growth peaks in early winter, and they persist until early spring.

• **OCCURRENCE** In piles of brushwood and on fallen deciduous branches, forming a white rot. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *Polyporus arcularius* occurs in the spring, has a circular, brown scaly cap with marginal hairs, and large hexagonal or angular pores.



FRUITING Singly or a few fruitbodies together.

Dimensions CAP ⇔ 3–8cm | STEM ↕ 2–6cm ↔ to 5mm	Spores White	Edibility

Family HYMENOCHAETACEAE	Species *Coltricia perennis*	Season Summer–winter

FUNNEL POLYPORE

This annual polypore is very unusual in that it grows in the soil rather than on dead wood. The cap is more or less funnel-shaped with fairly tough, rusty brown flesh. Its shiny upper surface has concentric zones in the golden brown shades typical of many Hymenochaetaceae. The tubes, 2mm long, are decurrent on the short, felty stem.

• **OCCURRENCE** On the ground, mostly on sandy soil in conifer woods, rarely among deciduous trees. Widespread and rather common in northern temperate zones.

• **SIMILAR SPECIES** Several tooth-fungi (pp.234–39) are similar above but have spiny undersides.

FRUITING Appears in small groups of fruitbodies.

Dimensions CAP ⇹ 2–10cm | STEM ↕ 2–6cm ↔ 3–8mm	Spores Golden brown	Edibility

Family GANODERMATACEAE	Species *Ganoderma lucidum*	Season All year

VARNISHED POLYPORE

This annual species has an oyster-shaped, shiny red and purple-black bracketlike cap with concentric ridges, a paler margin, and a lacquered brown stem to one side. The tube layer is brown with off-white pores, 3–4 per mm. The tough flesh, although off-white at first, also turns brown. Known as *Ling Chih* or *reishi*, it is a popular herbal tea.

• **OCCURRENCE** On the stumps or logs of deciduous trees. Widespread but local in northern temperate zones.

• **SIMILAR SPECIES** There are several closely related species, including *Ganoderma tsugae*, *G. oregonense*, and *G. curtissii*, some of which grow on conifers.

FRUITING Singly or in groups of fruitbodies around the stumps of deciduous trees.

Dimensions CAP ⇹ 10–30cm ↕ to 3cm | STEM ↕ 5–20cm ↔ 1–3cm	Spores Brown	Edibility

HONEYCOMB-, BRAIN-, OR SADDLELIKE CAP

Most of the species in this section are thought to have evolved from cup fungi (see p.264). Their "cup" is heavily folded and is raised on a stem.

The spore-producing surface, or hymenium, is smooth and sited on the folds. The choice morels, with a honeycomb-like structure, are found here.

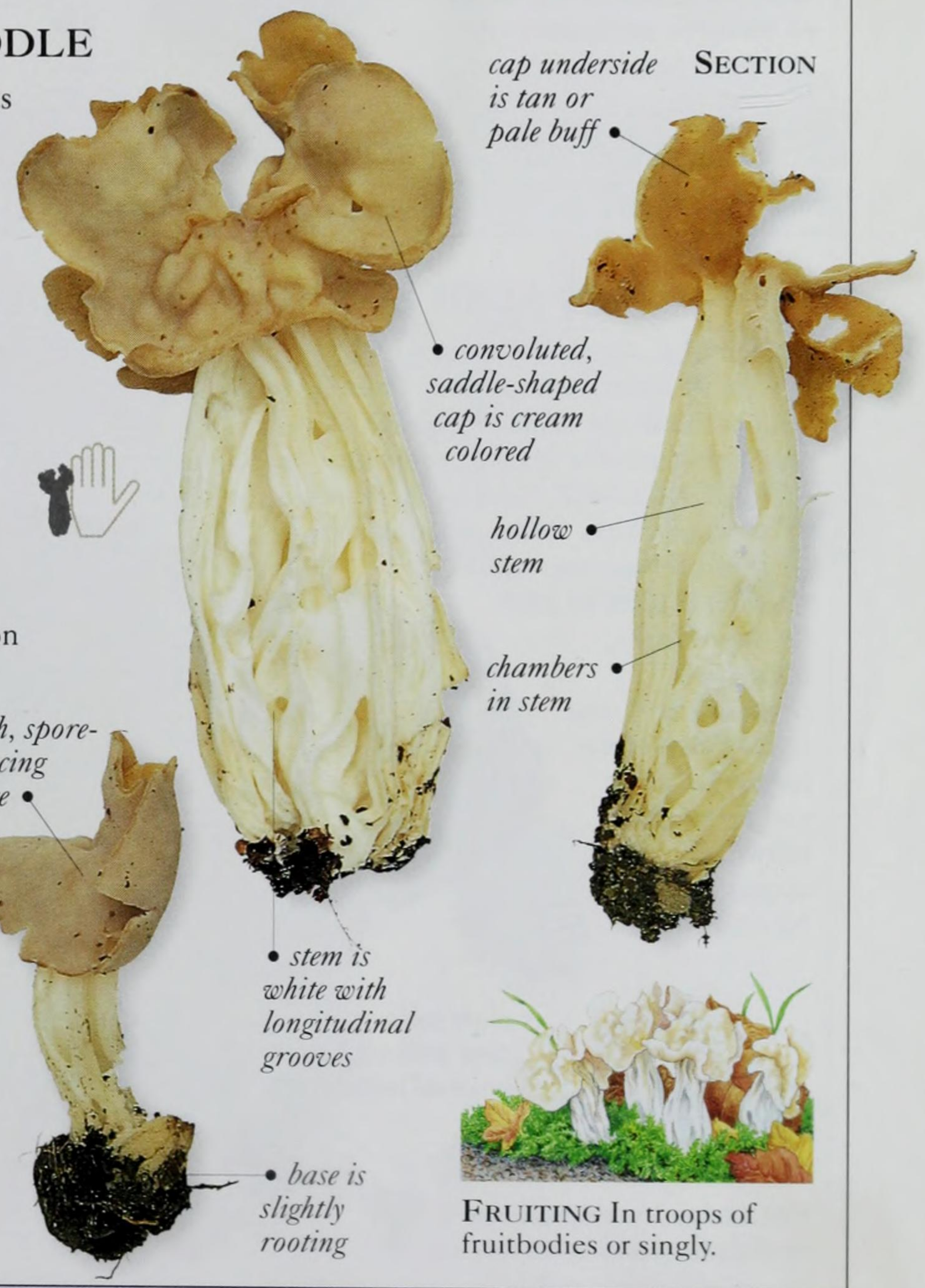
Family HELVELLACEAE	Species *Helvella crispa*	Season Summer–autumn

COMMON WHITE SADDLE

This species is easily identified by its furrowed, hollow, and chambered stem, its saddle-shaped cap, and its pale creamy white coloring. It varies in size but is typically large. With its thin flesh, it is not recommended and should be eaten only after being carefully dried until crisp or after boiling in water.

• **OCCURRENCE** In deciduous or coniferous woods on calcareous soil, often along paths and roads. It, and several other *Helvella* species, is frequently found alongside species of *Peziza* (pp.266–67) and *Inocybe* (pp.98–102). Widespread and common in most northern temperate regions.

△ ***STEREOPSIS HUMPHREYI*** This North American species has a saddle-shaped, dull white cap and a white stem. It is thought to be related to coral fungi (pp.248–51) and appears in large troops.



FRUITING In troops of fruitbodies or singly.

Dimensions CAP ⟷ 2–6cm | STEM ↕ 3–12cm ↔ 0.5–2.5cm	Spores White	Edibility

Family HELVELLACEAE	Species *Helvella lacunosa*	Season Summer–autumn

COMMON GRAY SADDLE

Perhaps the most common *Helvella* species, this fungus is extremely variable in size, shape, and color. It can be any shade of gray, and its cap is either saddle-shaped or convoluted and lobed. The stem has distinct grooves on the outside and is chambered within. The flesh is thin and gray to dirty white; like *Helvella crispa* (p.207), it is edible after thorough drying or boiling but is not recommended.

• OCCURRENCE In forests and more open areas on calcareous soil and gravel. Widespread in temperate and alpine zones of both the northern and southern hemispheres.

FRUITING In troops or singly on disturbed soil.

Dimensions CAP ⇹ 1–5cm | STEM ↕ 2–8cm ↔ 0.5–1.5cm	Spores White	Edibility

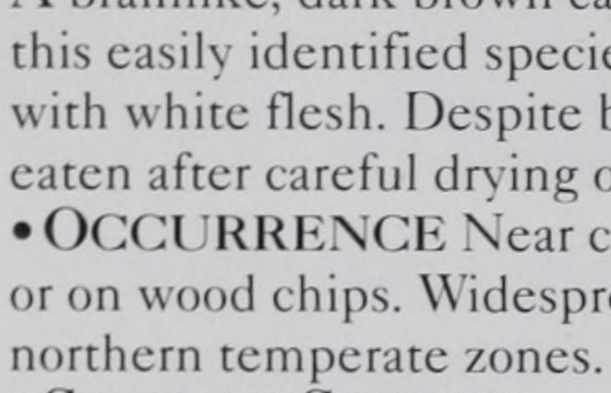
Family HELVELLACEAE	Species *Gyromitra esculenta*	Season Spring

CONIFER FALSE MOREL

A brainlike, dark brown cap with a chambered interior characterizes this easily identified species. The short white stem is almost hollow, with white flesh. Despite being poisonous, in parts of Europe it is eaten after careful drying or repeated boiling in fresh water.

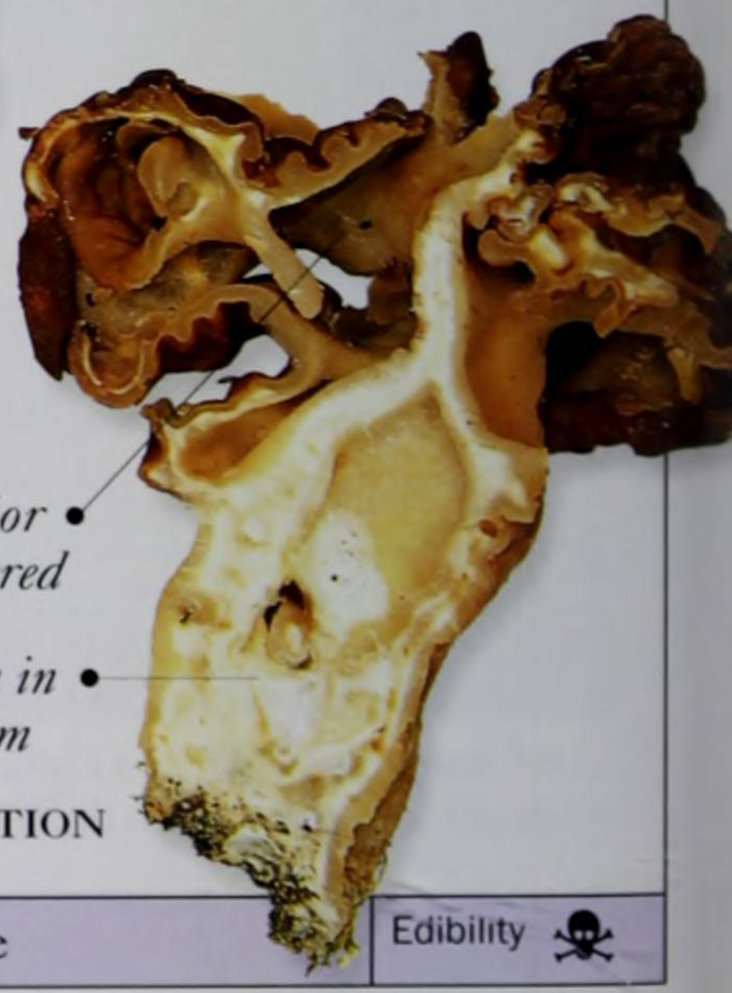
• OCCURRENCE Near conifers on sandy soil or on wood chips. Widespread in northern temperate zones.

• SIMILAR SPECIES *Gyromitra gigas*, *G. brunnea*, *G. caroliniana*, and *G. korfii* are often larger and more vivid orange-brown; common in parts of North America.



FRUITING In troops, often on disturbed soil near pine.

△ *GYROMITRA INFULA* Appearing in autumn, this species has a lobed brown cap and a chambered, lavender to white stem. ☠



Dimensions CAP ⇹ 5–15cm | STEM ↕ 1–5cm ↔ 2–4cm	Spores White	Edibility ☠

Family MORCHELLACEAE	Species *Verpa conica*	Season Spring

BELL MOREL

The smooth, hoodlike cap of this species is attached only at the very top of the stem. It is ovoid, becoming bell-shaped with age, and dark brown, paler within. The cylindrical stem is off-white with a mealy surface. Although edible, the flesh is thin; many fruitbodies are needed to make gathering this species worthwhile, and they are so rare in some areas that picking it is discouraged, but see SIMILAR SPECIES.

• **OCCURRENCE** On the ground, in rich soil, in mixed deciduous woods. Widespread in northern temperate zones, locally fairly common; rare in cold regions.

• **SIMILAR SPECIES** Also edible, *Verpa bohemica* has a wrinkled cap and 2-spored asci – those of *V. conica* are 8-spored. It can occur en masse.

FRUITING In troops among leaf litter, usually in undergrowth.

Dimensions CAP ⇹ 2–3cm ↕ 2–4cm | STEM ↕ 3–10cm ↔ 0.5–1.5cm	Spores Cream	Edibility

Family MORCHELLACEAE	Species *Morchella esculenta*	Season Spring

COMMON MOREL

This distinctive species has a ridged, honeycomb-like cap, ranging from ovoid to round or conical and fading to pale brown from dark brown as the spores mature on its surface. The white to cream stem is wider at the base and has a mealy surface. The off-white to pale brown flesh tastes and smells pleasant. Varying greatly in size and shape, *Morchella esculenta* is divided into several species by some mycologists.

• **OCCURRENCE** Under dead elms, old apple trees, poplars, tulip poplars, and conifers. Almost worldwide but less common in very cold or warm to hot regions.

• **SIMILAR SPECIES** *Gyromitra esculenta* (p.208) has a brainlike cap and is poisonous.

FRUITING Singly or in troops on nutrient-rich soil.

Dimensions CAP ⇹ 2–10cm ↕ 5–12cm | STEM ↕ 3–15cm ↔ 1–6cm	Spores Ochre-brown	Edibility

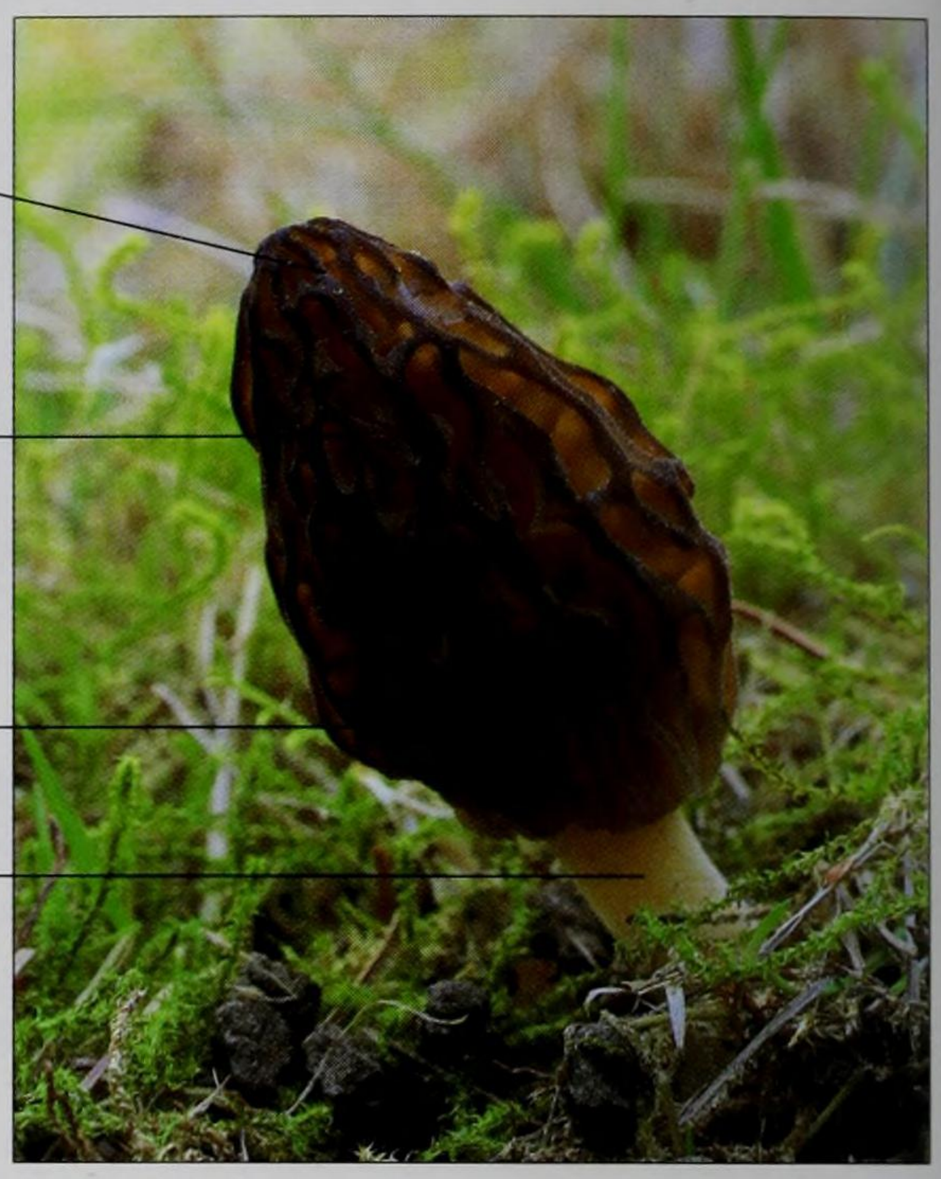
Family MORCHELLACEAE	Species *Morchella elata*	Season Spring

BLACK MOREL

This morel has a conical cap with distinct black ridges and brown to smoky-gray pits. The stem is white with a rough, mealy or granular surface and a hollow center. A popular edible with a crunchy texture and nutty flavor, the Black Morel can cause stomach upsets in some people.

• **OCCURRENCE** On the ground, in parks and open woods. Another form can appear in mountainous areas in summer. Widespread in northern temperate zones.

• **SIMILAR SPECIES** *Morchella esculenta* (p.209) is yellow and has pale ribs along the length of its cap. *Gyromitra* species (p.208), which are poisonous, lack the pitted cap and have chambered, rather than hollow, stems.



FRUITING In large numbers under trees; especially in burned areas.

Dimensions CAP ⇔ 5–10cm ↕ 2.5–5cm | STEM ↕ 5–10cm ↔ 2.5–5cm	Spores White to cream	Edibility

Family MORCHELLACEAE	Species *Morchella semilibera*	Season Spring

HALF-FREE MOREL

The conical, dark gray-brown cap of this small morel is free at the rim, with honeycomb-like ridges and pits. It has a slender, hollow, white to cream stem with a mealy surface. It is edible but the cream flesh is too thin to make it choice.

• **OCCURRENCE** Dense woodland on rich soil, along paths in damp places. Widespread and common; in eastern North America and the Pacific Northwest.

• **SIMILAR SPECIES** *Verpa* species (p.209) have small hood-like caps that are attached only to the very top of the stem.

FRUITING Often in troops hidden in dense vegetation.

Dimensions CAP ⇔ 1–2.5cm ↕ 1–4cm | STEM ↕ 3–10cm ↔ 1–2cm	Spores Cream	Edibility

BRACKET- OR SKINLIKE

This section features fungi that have shelflike fruitbodies, which grow from trunks or branches, as well as species that grow flat (resupinate) against a woody substrate, forming a skinlike crust. The spore-producing surface (hymenium) may consist of tubes, with pores on the surface, or may be smooth to wrinkled.

WITH PORES

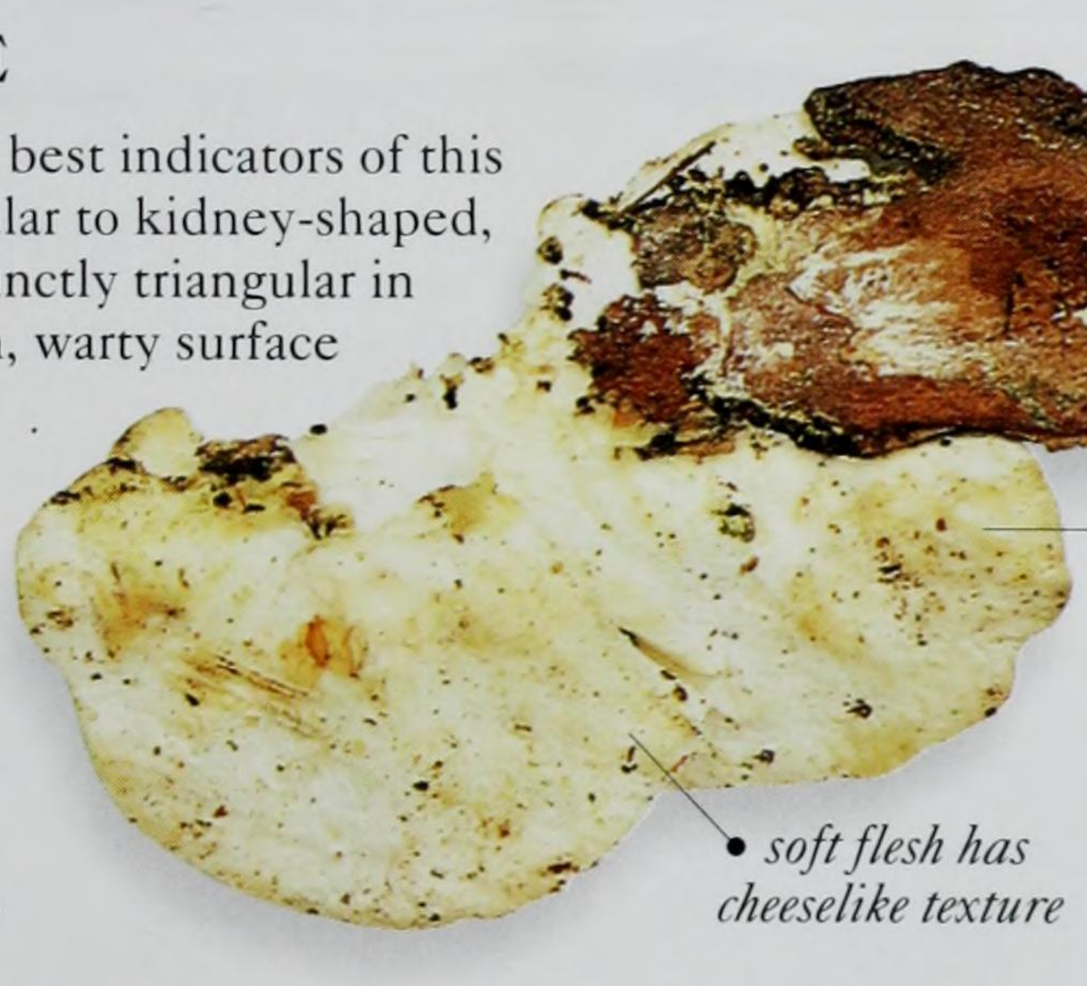
THE SPECIES in this subsection are known as polypores. Their spores are produced in tubes sited on their undersides and are dispersed through pores that can be rounded to elongated or mazelike in shape. The fruitbodies can be produced annually or continue to grow as long as the substrate lasts.

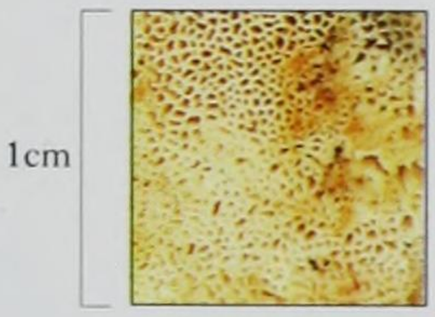
Family POLYPORACEAE	Species *Tyromyces stipticus*	Season Mainly autumn

BITTER POLYPORE

A very bitter taste is one of the best indicators of this species that produces semicircular to kidney-shaped, off-white annual brackets. Distinctly triangular in cross-section, they have a rough, warty surface and soft white flesh. In humid weather the pores exude an off-white liquid that dries to cream-white. The tube layer is 0.5–1cm thick; there are 4–6 pores per mm.

• OCCURRENCE Causes a brown rot on stumps or trunks of conifers; thus it is sometimes placed in the genus *Oligoporus*. Widespread and common in northern temperate zones, especially in the boreal regions.





PORE SURFACE

FRUITING Singly or a few together in woodland.

△ *OLIGOPORUS CAESIUS* The semicircular annual brackets of this brown rot polypore are spongy with a felty white surface that ages blue-black.

Dimensions BRACKET ↔ 5–12cm × 3–7cm ↕ to 2.5cm	Spores White	Edibility

Family POLYPORACEAE	Species *Piptoporus betulinus*	Season All year

BIRCH POLYPORE

This semicircular annual bracket fungus has a skinlike, brownish gray surface. It is stemless or has a rudimentary stemlike attachment. The soft but firm white flesh smells pleasant but is inedible. It was once used for sharpening razors and as a polishing agent in the watchmaking industry. The brackets are often attacked by flask fungi *Hypocrea pulvinata* when on the tree or by the orange *Hypomyces aurantius*, once the tree or polypore has fallen.

• OCCURRENCE In damp woods, often alongside *Fomes fomentarius* (p.219). It is parasitic on older birch trees, causing brown rot. The trees eventually die, but the polypore can continue fruiting on them for some time. Widespread and common in northern temperate zones.

bracket often swollen near attachment point

brownish gray surface may crack to reveal white flesh

SECTION

white tube layer is up to 1cm thick

white flesh is soft but tough

smooth, rounded margin

white pore surface with 3–4 pores per mm

FRUITING A few together on rotten birch trunks.

Dimensions BRACKET ↔ 5–30cm × 5–20cm ↕ 2–6cm	Spores White	Edibility

Family POLYPORACEAE	Species *Hapalopilus rutilans*	Season All year

PURPLE-DYE POLYPORE

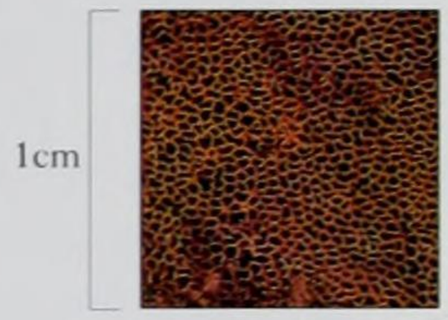
All parts of this fan-shaped annual bracket fungus are reddish cinnamon in color – the surface, the flesh, and the tube layer, which is up to 1cm thick. It has a remarkable reaction with an alkaline solution, turning brilliant purple, a characteristic that is exploited for dyeing wool. The relatively soft-textured flesh is inedible.

• **OCCURRENCE** On dead deciduous trees, where it produces white rot, in woods. Widespread and common to local in northern temperate zones.

• **SIMILAR SPECIES** *Pycnoporus cinnabarinus* (p.225) is tougher and a brighter cinnabar-red.

FRUITING Singly, in groups, fused, or in tiers, on dead wood.

SECTION



PORE SURFACE

Dimensions BRACKET ↔ 2–12cm × 2–8cm ↕ 1–4cm	Spores White	Edibility

Family FISTULINACEAE	Species *Fistulina hepatica*	Season Late summer–autumn

BEEFSTEAK POLYPORE

This species produces a tonguelike annual bracket with red tubes 1–1.5cm long and 2–3 pale red pores per mm. The tubes are easily separated, unusual for a polypore. The bracket is pink- to orange-red then purple-brown and may have a short stem. The flesh looks like beef or liver. It exudes a blood-red liquid; it smells pleasant and has the texture and flavor of beef tongue seasoned with lemon juice.

• **OCCURRENCE** Grows on mature living oaks; causes brown heart rot. Widespread but local in northern temperate zones.

SECTION

FRUITING On the lower trunks of mature trees.

Dimensions BRACKET ↔ 10–25cm × 10–20cm ↕ 2–6cm	Spores White	Edibility

Family POLYPORACEAE	Species *Meripilus giganteus*	Season Autumn

BLACK-STAINING POLYPORE

This massive species produces several densely layered annual brackets from a single short stem; a composite fruitbody can be up to 1m across. Each fan-shaped bracket has a smooth surface with concentric, golden brown zones and a wavy margin. The pleasant smelling white flesh is soft and fibrous; it is edible when young – turning gray to black when cooked – but has a poor flavor. The off-white tube layer is up to 1cm thick.

• OCCURRENCE In woods and parks, causing a white rot on dying deciduous trees. Widespread and fairly common in eastern North America.

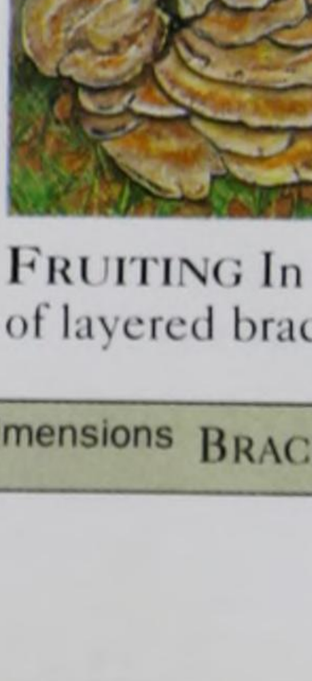
surface stains lead-gray when handled

flattened, fan-shaped brackets in dense layers

zones of golden brown on surface

paler bracket margin

wavy bracket margin



PORE SURFACE

single stem bears several brackets

FRUITING In dense tufts of layered brackets.

cream pores, 3–5 per mm, stain gray or brown

Dimensions BRACKET ↔ 10–30cm × 10–30cm ↕ 1–3cm	Spores White	Edibility

Family POLYPORACEAE	Species *Laetiporus sulphureus*	Season Early summer–late autumn

CHICKEN POLYPORE

This splendid, annual bracket fungus has an almost luminous quality with its large, quick-growing, yellow or yellow-orange fruitbodies. The thick, fleshy brackets are fan-shaped or irregularly semicircular with an uneven, suedelike surface. The flesh is pale yellow with a crumbly texture, especially when old, and smells of fresh lemon. A choice edible, it requires thorough cooking; some people are allergic to it.

• OCCURRENCE
On deciduous trees in some regions, conifers in others; mostly attacks the heartwood, causing a brown rot. Widespread and common in eastern North America.

SECTION

FRUITING Mostly in tiers, often high up in trees.

Dimensions BRACKET ⟷ 10–50cm × 10–30cm ↕ 1–5cm	Spores White	Edibility

Family POLYPORACEAE	Species *Grifola frondosa*	Season Summer–autumn

HEN-OF-THE-WOODS POLYPORE

This species has an annual fruitbody with tongue-shaped brackets branching off a central stem. Leathery with a wavy margin, the upper surface is gray, aging to brown. The decurrent tube layer is up to 5mm thick and off-white. The white flesh smells unpleasant when it ages. It is a choice edible, avidly collected in fall in eastern parks and woods.

• **OCCURRENCE** At the base of oak trees; produces a white rot. Widespread and common in eastern North America.

• **SIMILAR SPECIES** *Meripilus giganteus* (p.214).

FRUITING Clusters of brackets branch off from a thick, central stem near the base of trees.

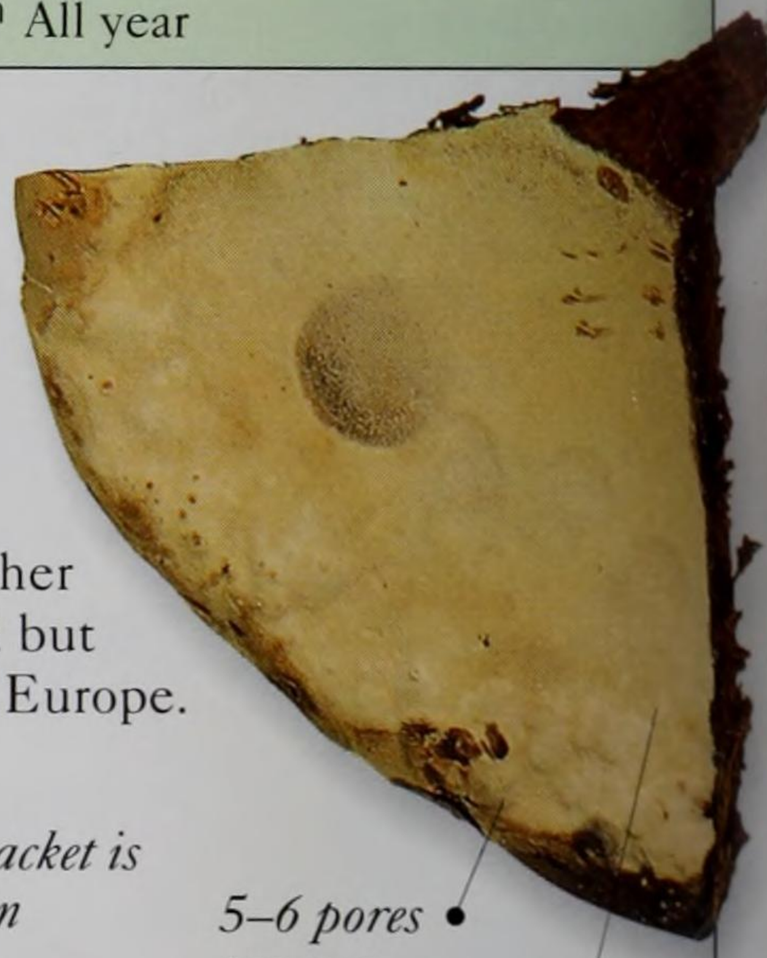
Dimensions BRACKET ↔ 2–6cm × to 7cm ↕ 0.2–1cm	Spores White	Edibility

Family GANODERMATACEAE	Species *Ganoderma pfeifferi*	Season All year

EURO VARNISHED POLYPORE

The upper surface of this hoof-shaped perennial bracket has concentric, orange-brown ridges covered by a thick, copper-colored lacquer that melts when exposed to a flame. The brown tube layer, to 10cm thick, is protected by a thick, waxy yellow substance in winter. The woody brown flesh has a pleasant smell.

• **OCCURRENCE** At the base of living beech trees, rarely other hosts, where it forms white rot. Widespread but local in central and southern Europe.



FRUITING In tiers near the ground or a few feet up.

Dimensions BRACKET ↔ 20–50cm × to 25cm ↕ to 15cm	Spores Brown	Edibility

Family GANODERMATACEAE	Species *Ganoderma applanatum*	Season All year

ARTIST'S POLYPORE

The upper surface of this semicircular perennial bracket is uneven, with concentric ridges and a thin margin. Beginning off-white, it becomes pale ocher-brown and is often covered with a brown spore deposit. The upper surface is easily broken; the pale buff underside can be scratched with a sharp point to produce a brown "artwork," hence the common name. The tube layer is brown and 0.5–4cm deep. The thin, dark brown flesh, often with pockets of white tissue, has a bitter taste and a "mushroomy" smell.

• **OCCURRENCE** On stumps and trunks of trees in parks and woods. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** Other species of *Ganoderma* have a shiny, lacquered upper surface.

bracket has grown around strand of ivy

pale buff pores, 4–6 per mm

uneven, tough bracket surface

thin layer of lacquer just visible

SECTION

thick brown spore deposit covers upper surface

flesh is dark brown, typically with pockets of white tissue

brown tubes

FRUITING Singly or in groups, mostly on dead trees.

Dimensions BRACKET ↔ 10–60cm × to 30cm ↕ 2–8cm	Spores Brown	Edibility

Family HYMENOCHAETACEAE	Species *Phellinus igniarius*	Season All year

GRAY FIRE POLYPORE

Gray to almost black in color, this perennial bracket is hoof-shaped and extremely woody, with thick margins. The bracket may remain on living host trees for many years. The hard flesh and tubes are rusty brown; new tubes, 1–5mm long, grow annually on the previous year's tubes. Tiny hairs, called setae, characteristic of the family, are concealed in the hymenium. Experts disagree on the exact identity of this species; a range of forms is covered here.

• OCCURRENCE
Parasitic on a number of deciduous trees, commonly birch, willow, and apple, causing white rot. Widespread and fairly common in northern temperate zones.

moss and lichen grow on the upper surface of older specimens

some cracking often occurs on gray to almost black surface

concentric ridges appear with age

broad area of attachment

gray to gray-brown pores

5–6 pores per mm

1cm

PORE SURFACE

FRUITING Singly or a few together on living trees.

Dimensions BRACKET ↔ 10–40cm × 10–20cm ↕ to 20cm	Spores White	Edibility

Family POLYPORACEAE	Species *Fomes fomentarius*	Season All year

TINDER POLYPORE

This polypore has a hoof-shaped, woody perennial bracket with zones varying from dark brown in older areas to pale brown at the growing margin, which is downy or felty. A new brown tube layer grows annually. Each year's tube layer is 5mm thick. The pore surface is gray to gray-brown. Existing in several forms, depending on the host, this species has been used as tinder and to make hats and other clothing.

• **OCCURRENCE** Parasitic on deciduous trees, especially beech and birch, and forms white rot. It fruits on fallen wood. Widespread and often common in northern temperate zones.

• **SIMILAR SPECIES** *Fomitopsis pinicola* (inset, right).

△ ***FOMITOPSIS PINICOLA***
This gray perennial species has bright yellow and red zones near its margin. The bracket surface feels lacquered and melts under a flame. The pores are pale yellow, and the hard flesh is white to yellow with a characteristic acidic smell.

SECTION

FRUITING Appears singly or in rows of brackets.

Dimensions BRACKET ↔ 5–30cm × to 25cm ↕ 5–30cm	Spores White	Edibility

Family POLYPORACEAE	Species *Phaeolus schweinitzii*	Season Summer–winter

PINE DYE POLYPORE

Impressive when actively growing, this annual bracket mushroom arises from a very short, more or less central brown stalk, and has a brilliant sulfur-yellow margin surrounding concentric zones of rusty brown. As the bracket ages, it turns dirty brown then slowly rots away. The sulfur-yellow tube layer is up to 1cm thick with pores, 1–4mm in diameter, that are greenish yellow when young, turning dark brown when touched. The inedible, fibrous, yellow to brown flesh contains a pigment used in dye.

• OCCURRENCE Around living or dead conifers and Douglas fir, especially pine, causing brown rot. Widespread and common in northern temperate zones; cosmopolitan.

sulfur-yellow young specimen

uneven surface with color zones

bracket surface is very felty or hairy

old specimen is dark brown all over

1cm

PORE SURFACE

FRUITING Mostly solitary from underground roots.

Dimensions BRACKET ↔ 15–30cm × 10–25cm ↕ 1–4cm	Spores White	Edibility

Family HYMENOCHAETACEAE	Species *Inonotus hispidus*	Season Summer–autumn

SHAGGY POLYPORE

The thick-fleshed, fan-shaped annual bracket of this species is distinguished by its shaggy surface. Flame-red when young, it gradually turns brown from the inner part of the fruitbody outward; the pore surface is white to pale brown, becoming darker with age, and often appears shiny. There are 2–3 pores per mm. The pale brown tube layer is 1–3cm deep. Scattered, short, thick hairs (setae) are enclosed in the spore-bearing tissue (hymenium).

• **OCCURRENCE** Parasitic on deciduous trees such as ash, pear, apple, and walnut, causing white rot. Widespread and common to rare in northern temperate zones.

• **SIMILAR SPECIES** *Inonotus cuticularis* has smaller brackets and occurs on beech and oak. *I. rheades* is also smaller and occurs on aspen.

FRUITING Appears singly or in fused groups on living deciduous trees, stumps, and logs.

Dimensions BRACKET ↔ 15–40cm × 10–20cm ↕ to 10cm	Spores Yellow	Edibility

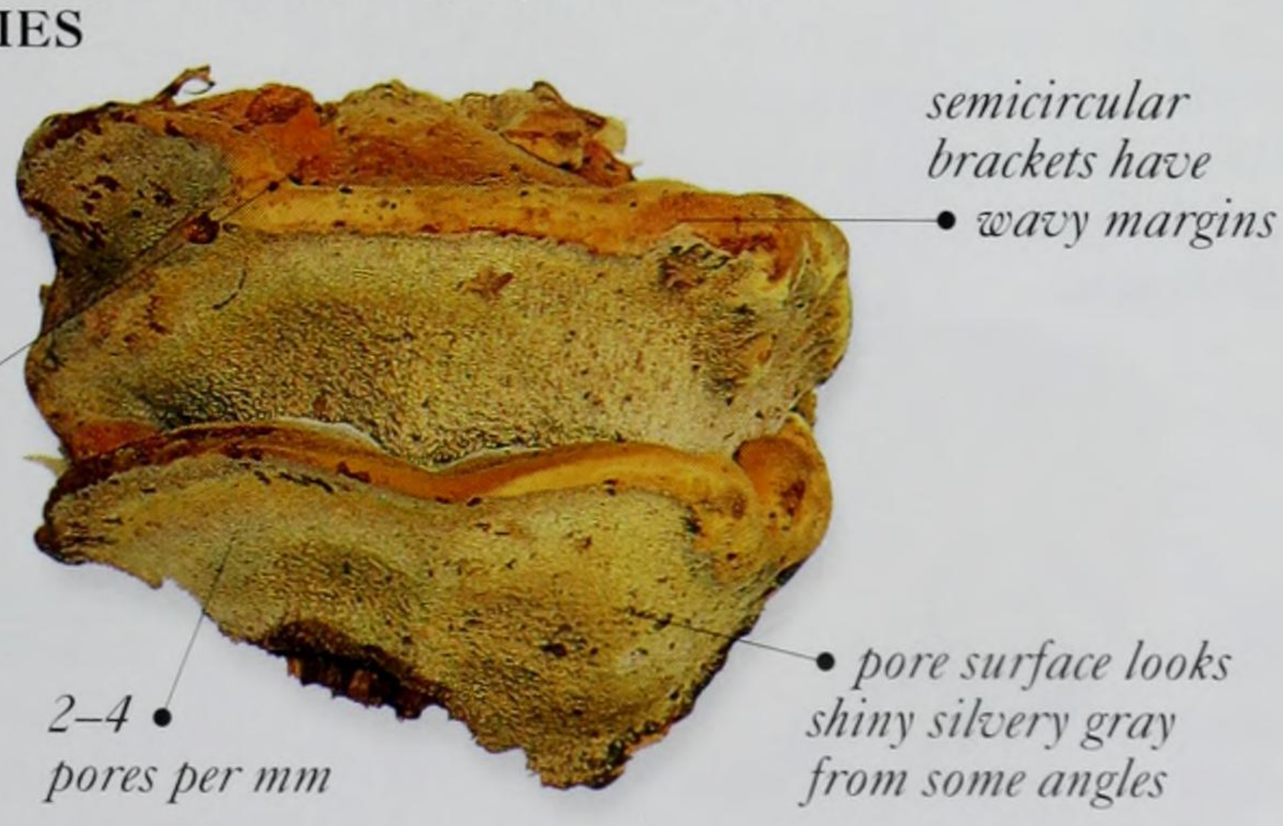
Family HYMENOCHAETACEAE	Species *Inonotus radiatus*	Season All year

ALDER BRACKET POLYPORE

This polypore forms semicircular, wavy-margined annual brackets. The upper surface is bright yellow to orange-red when young, becoming zoned in shades of rusty brown. When young and growing, the pore surface often has yellow drops on it; with age, it reflects the light and appears shiny and silvery. The tubes are 1cm long, and the hymenium encloses tiny, short, curved hairs (setae).

• **OCCURRENCE** Parasitic, mostly on standing alder trunks or on birch trees. On fallen tree trunks it may develop just the tube layer over the bark (resupinate). Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *Inonotus nodulosus* has less distinct brackets and occurs on beech.



FRUITING Tiers and rows on dead wood.

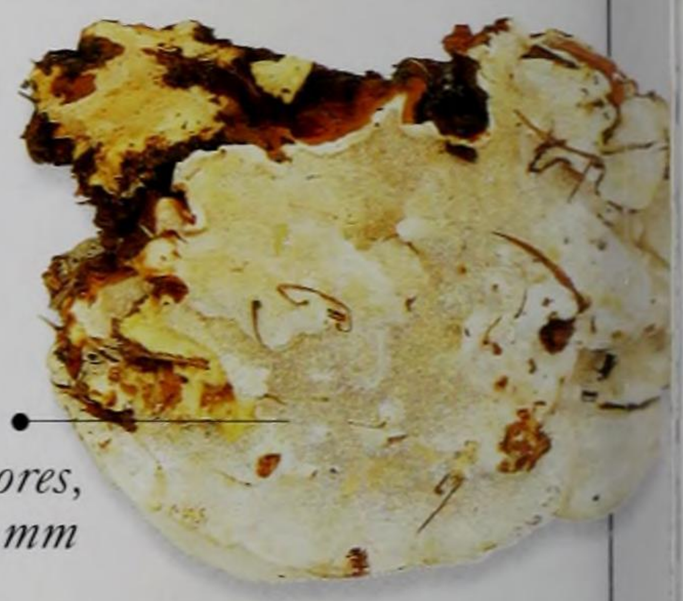
Dimensions BRACKET ↔ 3–8cm × 1–3cm ↕ to 3cm	Spores Pale yellow-brown	Edibility

Family POLYPORACEAE	Species *Heterobasidion annosum*	Season All year

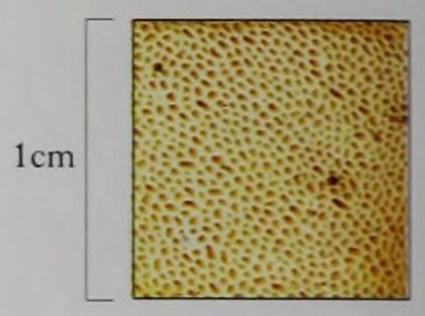
CONIFER-BASE POLYPORE

The perennial bracket of this species is irregular with a very uneven surface and a corklike texture. The crust darkens with age; the margin is white, often with an orange band just behind it. The white to cream tube layer is up to 1cm thick or more, and the inedible flesh is pale yellow. Occasionally, this species grows against the substrate, without brackets (resupinate).

• **OCCURRENCE** Causes a white rot on conifer stumps, rarely on deciduous trees. In densely planted conifer stands, it can spread underground to infect healthy trees. Widespread in northern temperate zones.



SECTION



PORE SURFACE

FRUITING In groups of brackets or singly.

Dimensions BRACKET ⇔ 5–25cm × 3–15cm ↕ 1–3cm	Spores White	Edibility

Family POLYPORACEAE	Species *Gloeophyllum odoratum*	Season All year

ANISE-SCENTED POLYPORE

This species develops perennial brackets, which are cushion-shaped and slightly felted. The margin is golden yellow to orange; older parts are almost black. There are 1–2 golden yellow pores per mm and the tube layer is up to 1cm thick. The corklike flesh is rust-brown. Although not edible, it smells pleasantly of fennel and oranges.

• **OCCURRENCE** On conifers, usually spruce; causes brown rot. Widespread in northern temperate zones.

• **SIMILAR SPECIES** Widespread and common, *Gloeophyllum abietinum* and *G. sepiarium* have gill-like pores and typically occur on sun-baked conifers.

PORE SURFACE

FRUITING Mostly singly or in groups on tree stumps.

Dimensions BRACKET ⇔ 5–20cm × 5–20cm ↕ 2–5cm	Spores White	Edibility

Family POLYPORACEAE	Species *Trametes gibbosa*	Season All year

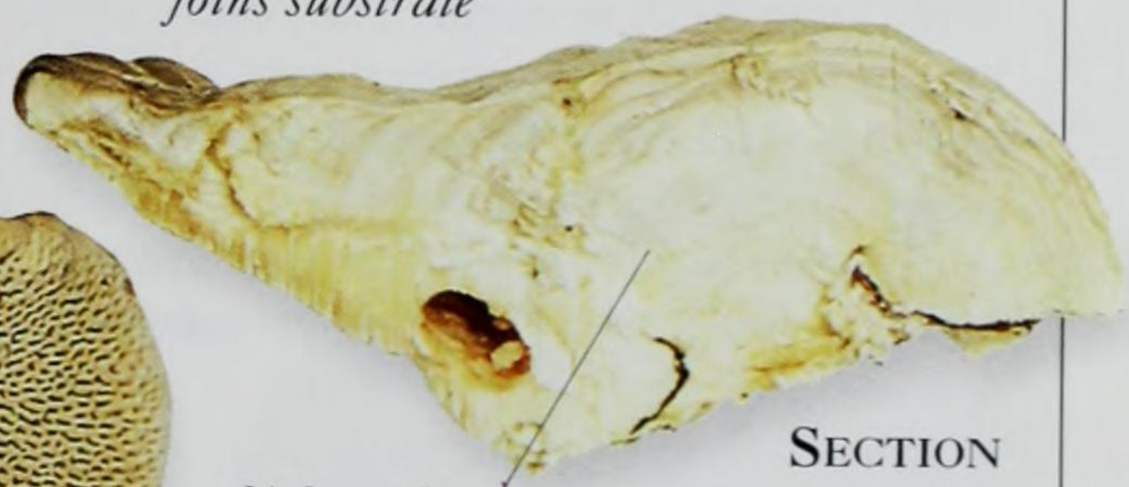
EURO BEECH POLYPORE

Annual or perennial, the large brackets of this species are semicircular with the inner part of the upper surface usually stained green by algae. Concentric color zones occur near the smooth margin. Young specimens are chalk-white with a downy or minutely hairy surface, becoming smooth with age. The white flesh is tough and inedible; the tube layer, to 4mm thick, has elongated cream pores.

• **OCCURRENCE** In woods; typically forms white rot on beech. Widespread and rather common in northern temperate zones.

• **SIMILAR SPECIES** *Trametes hirsuta* (p.224) is thinner and hairier with less elongated, grayer pores.

PORE SURFACE



SECTION

FRUITING Singly or in tiers on deciduous stumps.

Dimensions BRACKET ↔ 10–30cm × 5–20cm ↕ 1–4cm	Spores White	Edibility

Family POLYPORACEAE	Species *Trametes hirsuta*	Season All year

HAIRY POLYPORE

This species produces annual brackets with straight surface hairs, which are stiff and upright on the inner areas. The surface has concentric ridges and off-white to yellow-brown zones, which become darker with age. The pores are angular, and the white tube layer is 1–4mm thick. The white flesh is tough.

• **OCCURRENCE** Appears in woodland sites that have been exposed to sun through wood cutting or storm damage. It produces white rot on a range of deciduous trees. Widespread and fairly common in northern temperate zones.

• **SIMILAR SPECIES** *Trametes pubescens*, a more northerly species, has yellower pores. *Cerrena unicolor*, also occurring in more northerly areas, has more irregular pores and a black line above the tube layer.

FRUITING In rows and tiers on fallen deciduous trunks.

Dimensions BRACKET ↔ 5–12cm × 3–8cm ↕ 0.3–1cm	Spores White	Edibility

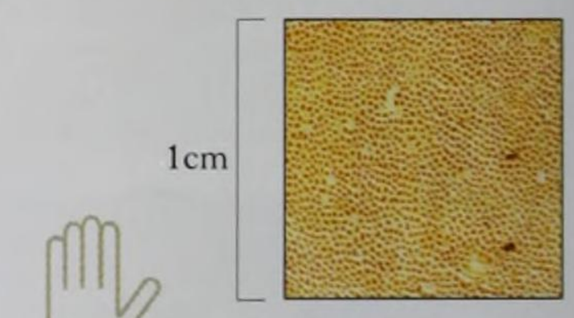
Family POLYPORACEAE	Species *Trametes versicolor*	Season All year

TURKEY-TAIL POLYPORE

Thin, layered brackets with alternating zones of either gray or brown shades characterize this familiar fungus. The fruitbody is annual but may develop further in spring. Narrowly attached to the substrate, the brackets are widely fan-shaped. The tube layer, to 3mm thick, is white, drying to pale yellow, and there are 3–4 pores per mm. The tough flesh is white. The smaller specimen shown here is a typical form, zoned gray and dark blue-gray.

• **OCCURRENCE** On deciduous trees, in woods, parks, and gardens; forms white rot. Widespread and very common throughout northern temperate zones.

• **SIMILAR SPECIES** *Trametes ochracea*, a more northerly species, is slightly thicker and browner, with larger pores.



PORE SURFACE

FRUITING In dense rows and tiers on tops or sides of stumps.

Dimensions BRACKET ↔ 2–7cm × 1–5cm ↕ 1–5mm	Spores White	Edibility

Family POLYPORACEAE	Species *Bjerkandera adusta*	Season All year

SMOKY POLYPORE

Abundant in suitable habitats, this species produces a thin annual bracket with concentric zones of gray-brown, a wavy felted surface, and a lobed margin. The tube layer, which is up to 2mm thick, has distinctive, tiny, ash-gray pores; in cross-section, a thin, dark layer is visible between the off-white flesh and the tube layer. It smells strongly "mushroomy."

• **OCCURRENCE** Parasitic or saprotrophic on deciduous trees, particularly beech, in woods; forms white rot. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *Bjerkandera fumosa*, often on willow or ash, is rarer. It is larger and has paler pores.

PORE SURFACE

FRUITING Grows in rows or tiers of fruitbodies.

Dimensions BRACKET ↔ 3–7cm × 1–5cm ↕ to 8mm	Spores White-cream	Edibility

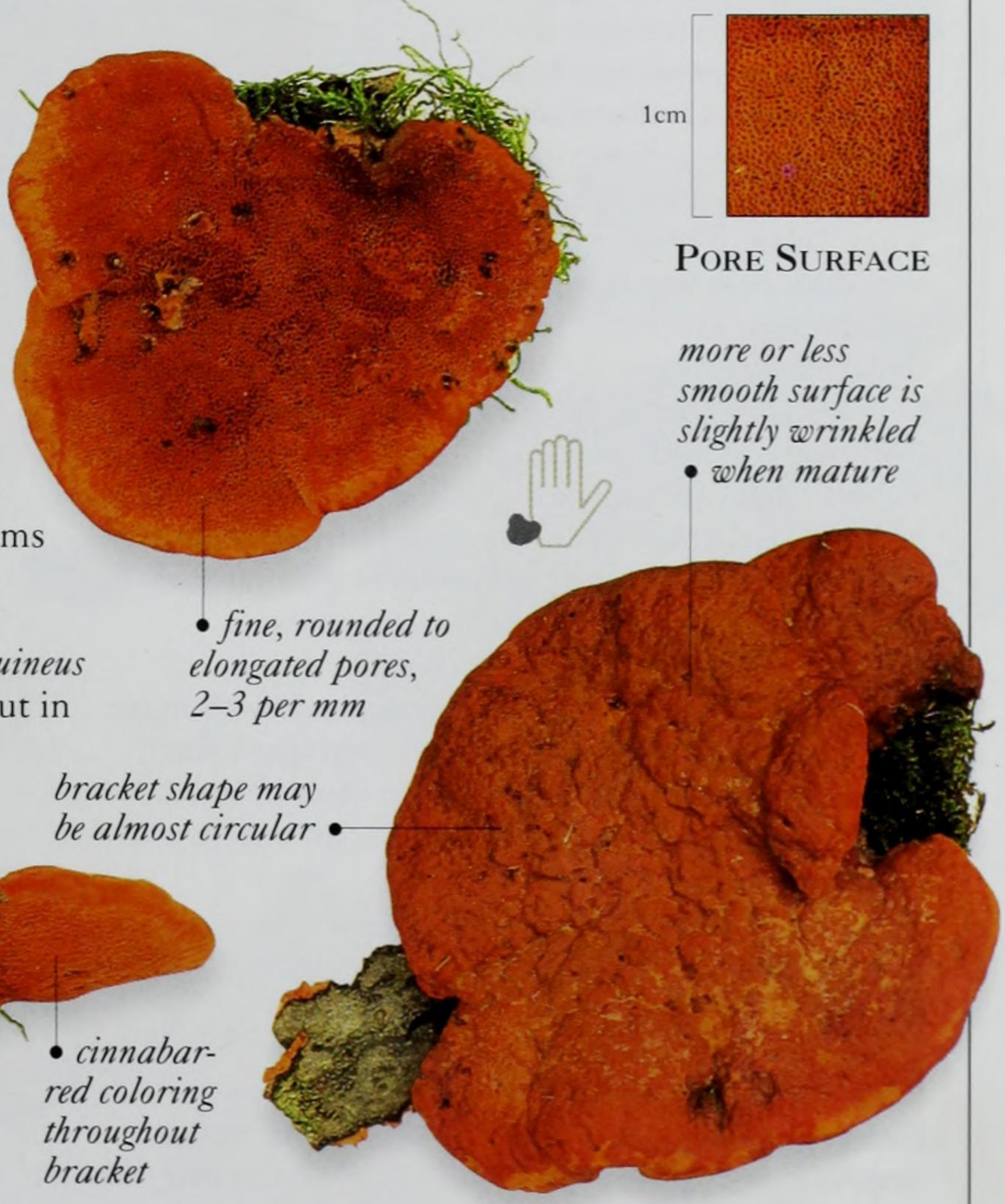
Family POLYPORACEAE	Species *Pycnoporus cinnabarinus*	Season All year

CINNABAR POLYPORE

The uniform bright cinnabar-red coloring of this species makes it easy to identify. The annual bracket is semicircular to fan-shaped, with fine, silky hairs on the upper surface. It becomes paler as it ages and almost smooth, with a thin, sharp margin. The tube layer is 4–6mm thick. The flesh becomes corky when dried.

• **OCCURRENCE** On dead deciduous trees in warm, sunny, exposed areas; forms a white rot. Widespread and common to rare in northern temperate zones.

• **SIMILAR SPECIES** *Pycnoporus sanguineus* is thinner and is found in similar sites but in warmer climates.



PORE SURFACE

FRUITING Appears singly or a few together.

Dimensions BRACKET ↔ 3–10cm × 2–6cm ↕ 0.5–2cm	Spores White	Edibility

Family POLYPORACEAE	Species *Trichaptum abietinum*	Season All year

PURPLE-TOOTH POLYPORE

Tending to be abundant where it occurs, this widely fan-shaped annual bracket fungus has concentric grooves on the felty, pale gray surface, which is often tinged green by algae; the purple margin is typically wavy and lobed. When young, the tube layer, to 5mm thick, is purple, becoming reddish brown. The angular pores often split with age. It has tough, pale brown or purple flesh.

• **OCCURRENCE** On conifers, mostly spruce; it causes white rot. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *Trichaptum biforme* has wider, less resupinate brackets, and grows on deciduous trees. Other *Trichaptum* species found on conifers, such as *T. fusco-violaceum* on pine, are distinguished by teeth or gills on the underside.

FRUITING In rows and tiers, often fused in groups.

Dimensions BRACKET ↔ 2–4cm × 2cm ↕ 2–3mm	Spores White	Edibility

Family POLYPORACEAE	Species *Daedalea quercina*	Season All year

THICK-MAZE POLYPORE

This species produces a thick, semicircular perennial bracket with a smooth but uneven surface that is creamy yellow or dull ocher-brown to pale gray. Slightly flexible when fresh, it dries wood-hard. The inedible, pale wood-brown flesh smells faintly "mushroomy." Young pores near the growing margin are rounded but develop into a maze of thick plates radiating from the attachment point; the tube layer is 1–3cm thick, the separating walls 1.5–2mm thick.

• **OCCURRENCE** Parasitic or saprotrophic on oak trees in woods and parks; forms brown rot. Widespread in northern temperate zones; common in eastern North America.

• **SIMILAR SPECIES** Other polypores with maze-like pores, including *Daedaleopsis confragosa* and *Lenzites betulina* (both p.227), have thinner brackets and do not occur on oak heartwood.

FRUITING Singly or in tiers; may be in shelved groups.

Dimensions BRACKET ↔ 10–30cm × 5–20cm ↕ 3–7cm	Spores White	Edibility

Family POLYPORACEAE	Species *Daedaleopsis confragosa*	Season All year

THIN-MAZE POLYPORE

Broadly fan-shaped with a smooth to warty surface, the annual brackets of this species are thin, thickening only toward the attachment area. The surface is smooth to warty and pale gray to yellow, aging dingy red-brown – overall or in concentric zones. Corklike in texture, the inedible flesh is pale wood-brown, and the pores, which are pale gray when young, turn red when bruised. The tube layer, 0.5–1cm thick, is reddish brown.

• **OCCURRENCE** On a wide range of deciduous trees in some areas, more restricted in others – willow is favored; forms a white rot. Widespread and rather common in northern temperate zones.

SECTION

PORE SURFACE

FRUITING In vertical rows on dead or dying wood.

Dimensions BRACKET ↔ 8–15cm × 5–10cm ↕ 0.5–4cm	Spores White	Edibility

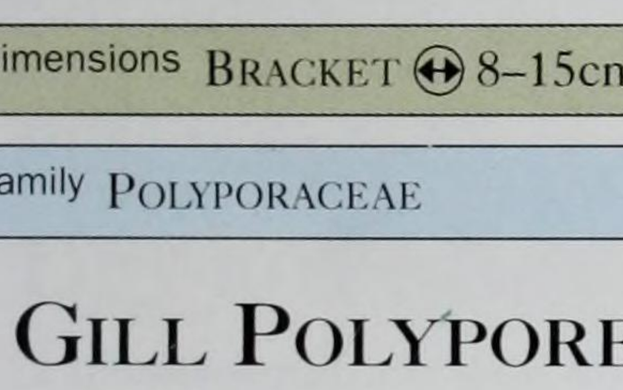
Family POLYPORACEAE	Species *Lenzites betulina*	Season All year

GILL POLYPORE

This species has a semicircular, leathery annual bracket covered in fine hairs and zoned in shades of brown. The underside has gill-like pores, characteristic of this small genus. The tough, inedible flesh is white and corklike.

• **OCCURRENCE** Mainly on deciduous trees, sometimes on conifers. Favors birch in some areas, oak or beech in others; forms white rot. Widespread and fairly common to locally rare, in northern temperate zones.

• **SIMILAR SPECIES** *Trametes gibbosa* (p.223) has pores that are rounded to slightly elongated.



FRUITING Appears singly or in rows and tiers.

Dimensions BRACKET ↔ 3–10cm × 1–5cm ↕ 1–2cm	Spores White	Edibility

WRINKLED OR SMOOTH UNDERNEATH

NOT ALL BRACKETLIKE mushrooms produce fruitbodies with a tube layer and pores on their underside (pp.211–27); some have the spore-producing cells (basidia) sited on a wrinkled, veined, warty, spiny, or completely smooth surface. This type of bracket is featured in this subsection. The other species featured here have tubes and pores but occasionally bear fruitbodies that grow flat against the substrate surface (resupinate). These species have a layer of flesh supporting the spore-producing tissue.

Family CORTICIACEAE	Species *Phlebia tremellosa*	Season Autumn–early winter

TREMBLING PHLEBIA

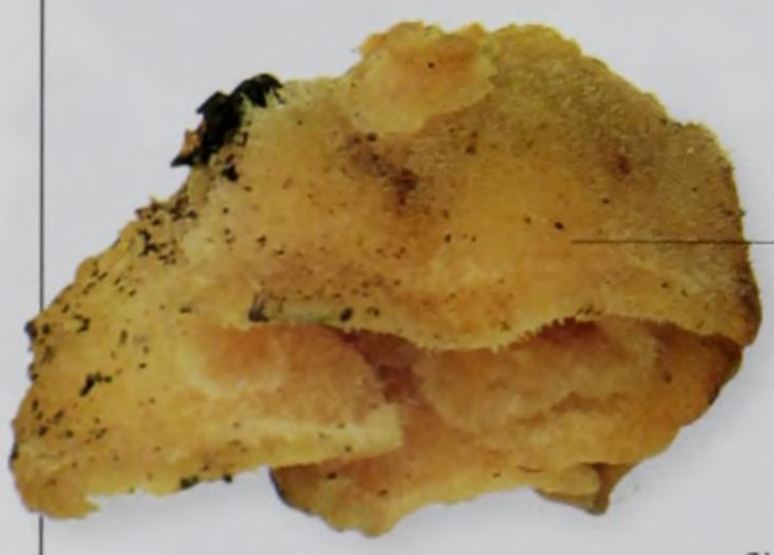
Exceptional among *Phlebia* species, which are usually resupinate, this mushroom has well-developed, protruding annual brackets, although part of the spore-producing layer runs down the bark. The upper side is velvety and almost white, while the underside is yellow to orange and covered with dense ridges and veins. The structure is soft and gelatinous.

• **OCCURRENCE** On the stumps of deciduous trees, such as birch and beech; very rarely on conifers. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** The closely related *P. radiata* is common on similar substrates, but is bright orange and thinner; it is fully resupinate, without brackets. The underside has radiating veins and wrinkles.

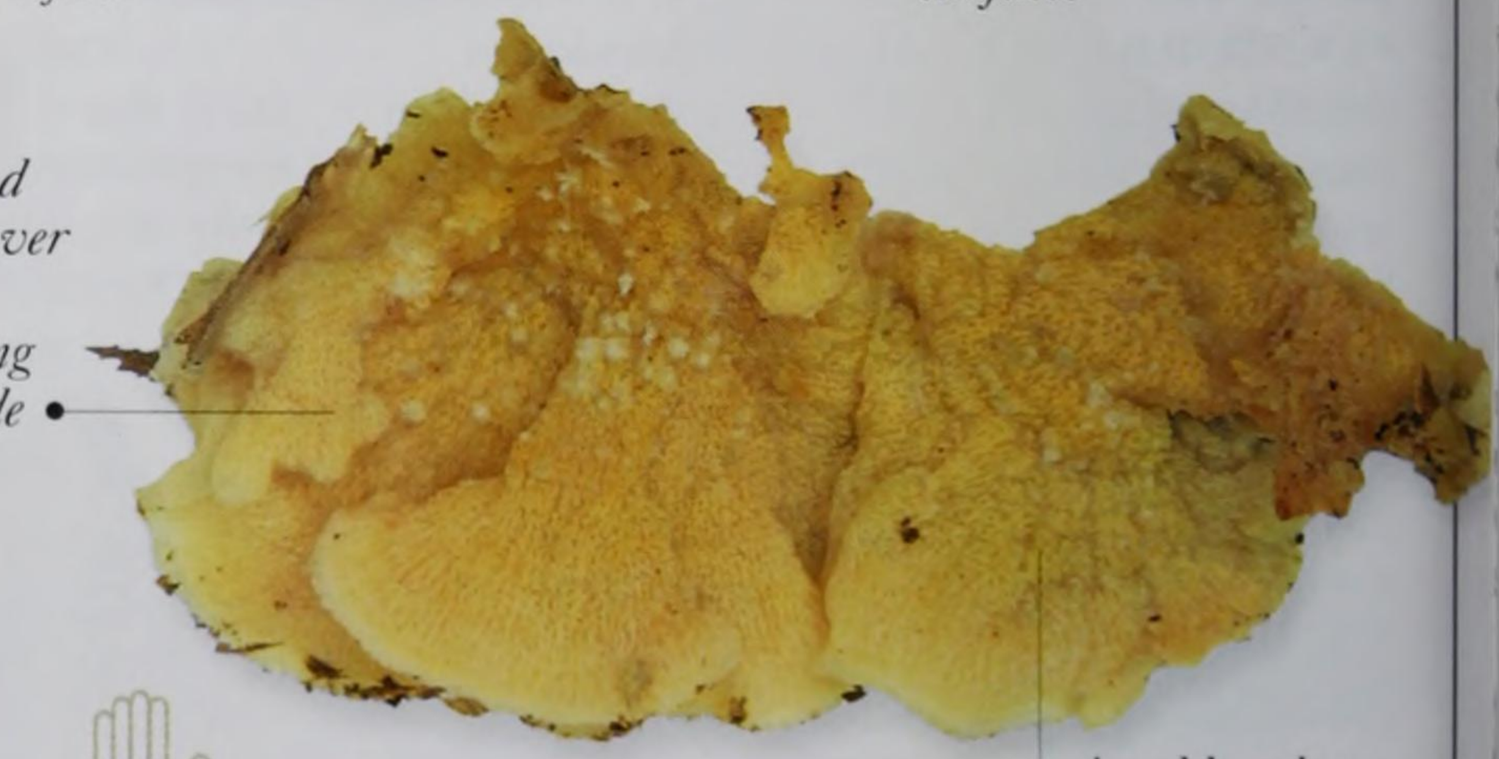
• velvety upper surface is almost white

• brackets have hairy margins and surfaces



• gelatinous, elastic, orange to pink flesh

veins and ridges cover spore-producing underside •



• tiered brackets are semicircular

FRUITING In dense tiers of joined brackets.

Dimensions JOINED BRACKETS ⇔ 4–15cm × 2–4cm ↕ 1–3mm	Spores White	Edibility

Family THELEPHORACEAE	Species *Thelephora terrestris*	Season All year

COMMON THELOPHORA

Similar in appearance to some lichens, the fringed, fan-shaped fruitbodies of this fungus are well camouflaged by their earthlike colors. The upper surface is uneven and fibrous; the spore-producing underside is warty and slightly paler in color. The inedible flesh is thin and brown.

• **OCCURRENCE** Mycorrhizal with trees in woods and waste ground, on acidic soil or decayed stumps; often found along paths and trails. Also found in plant nurseries with conifer seedlings. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *Thelephora caryophyllea* is deeply funnel-shaped and has a less felty surface. An uncommon resupinate form of *T. terrestris* is similar to species of *Tomentella*.

FRUITING Appears in layered, joined brackets.

Dimensions JOINED BRACKETS ↔ 4–10cm × 1–6cm ↕ 2–3mm	Spores Brown	Edibility

Family CONIOPHORACEAE	Species *Serpula lacrymans*	Season All year

DRY-ROT MUSHROOM

This mushroom is well known for the brown rot it causes, which severely weakens construction lumber inside houses. The semicircular, veined, resupinate or bracket-forming fruitbody is in shades of brown and exudes acidic white droplets from the growing margin. It stains red-brown when touched and is rubbery in texture. The fungus also produces a copious white weft of mycelium.

• **OCCURRENCE** Thrives inside poorly ventilated buildings where alkaline substances, such as mortar, neutralize its acidic droplets, which would otherwise make its growing environment too acid. Widespread and common in buildings; in the wild, on the east and west coasts of North America and in the Himalayan foothills of India.

FRUITING Fully resupinate or with brackets on wood and walls in houses.

Dimensions FRUITBODY ↔ to 50cm × to 10cm ↕ 0.5–2cm	Spores Yellow to olive-brown	Edibility

Family AURICULARIACEAE	Species *Auricularia mesenterica*	Season All year

BRACKET JELLY

At first glance, this annual bracket could be mistaken for species of *Trametes* (pp.223–24) or *Stereum* (p.232 and below), but it is distinguished by, among other features, its gelatinous flesh. The zonation on the top surface is due to fine velvety hairs. The spore-producing underside of the bracket is wrinkled and veined. Although edible, it is not worth eating.

• **OCCURRENCE** Found on deciduous wood; where there is dead elm, it can be abundant with other elmwood species. Absent in all but the southernmost part of the United States, but it is reported from Mexico south to Argentina.

FRUITING In tiers on trunks and stumps.

Dimensions BRACKET ↔ 4–15cm × 1–5cm ↕ 2–5mm	Spores White	Edibility

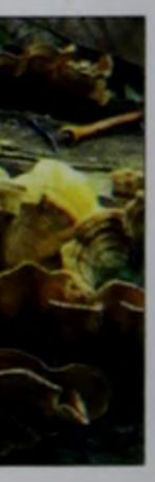
Family CORTICIACEAE	Species *Stereum hirsutum*	Season All year

HAIRY STEREUM

This species produces a long-lived, fan-shaped, bright yellow to tan bracket with a smooth spore-bearing surface that often runs down the substrate. The upper surface is hairy, with indistinct concentric zones; it is paler at the margin. The similarly colored flesh is thin but tough and does not stain. The spores are amyloid.

• **OCCURRENCE** On deciduous trees, especially oak, birch, and beech; often on bark or on the cut surfaces of stored wood. Widespread in northern temperate zones; common in eastern North America.

• **SIMILAR SPECIES** *Stereum gausapatum* and *S. rugosum* (p.232) are more resupinate and stain red. *S. ochraceo-flavum* is smaller with duller undersides.



△ *STEREUM SUBTOMENTOSUM*
This species has wide, less resupinate brackets with more distinct zones. Its flesh stains yellow.

FRUITING Appears in abundant linked brackets.

Dimensions BRACKET ↔ 2–6cm × to 3cm ↕ 1–2mm	Spores White	Edibility

Family CORTICIACEAE	Species *Chondrostereum purpureum*	Season All year

PURPLE SILVER-LEAF STEREUM

This fungus is easy to identify because of its habit of producing a multitude of wavy-margined brackets, which are purple when young. The upper surfaces are white-downy; the undersides are smooth and purple-brown. When dry, they tend to be hornlike in texture. The flesh is waxy and somewhat gelatinous. Unlike *Stereum* species, the spores do not develop a blue coloring with iodine reagents.

• OCCURRENCE Parasitic or saprotrophic on many deciduous trees; causes silver-leaf disease on cherry and plum trees, eventually producing white rot in the wood. Widespread in northern temperate zones; common in most regions.

FRUITING In tiers and rows of linked brackets.

Dimensions LINKED BRACKETS ↔ 2–5cm × to 4cm ↕ 1–2.5mm	Spores White	Edibility

Family HYMENOCHAETACEAE	Species *Hymenochaete rubiginosa*	Season All year

RIGID LEATHER BRACKET

This well-camouflaged, rigid, perennial bracket fungus with wavy margins occurs in abundant tiers. The top surface is marked with concentric brown zones, increasing in number and becoming very dark with age; the cocoa-brown underside seems smooth, but examination with a powerful hand lens reveals a covering of tiny rigid hairs (setae). The flesh is very tough, thin, and cocoa-brown.

• OCCURRENCE Grows on the stumps or fallen branches of oak. Widespread and common in eastern North America.

FRUITING In crowded tiers of brackets.

Dimensions BRACKET ↔ 1–6cm × 1–4cm ↕ 1mm	Spores White-cream	Edibility

SKINLIKE; GROWING FLAT OR CRUSTLIKE

IN THIS SUBSECTION are some of the many fungi that produce fully resupinate, skinlike fruitbodies on the underside of fallen wood. They range from white to pink or deep blue. The spore-producing surface (hymenium) of these species can be smooth, warty, spiny, or veined. (See also pp.228–31.)

Family CORTICIACEAE	Species *Stereum rugosum*	Season All year

RED-STAIN STEREUM

This abundant woodland fungus, which may grow for several seasons, forms a thick, flat, rather featureless, pale gray skin on bark; brackets rarely occur. Scraping the surface of the fungus soon produces blood-red marks. The spores are amyloid.

• **OCCURRENCE** On deciduous trees, often standing dead trunks; frequently found on hazel, birch, and alder. Widespread and common in Europe; probably also in a wider area in northern temperate zones.

• **SIMILAR SPECIES** *Stereum sanguinolentum* also stains red when damaged, but it is found on bark of conifers and has distinct brackets.

FRUITING Long, skinlike patches on dead wood.

Dimensions FRUITBODY ↔ 10–50cm × 1–6cm ↕ 2–5mm	Spores White	Edibility

Family POLYPORACEAE	Species *Schizopora paradoxa*	Season All year

SPLIT-PORE POLYPORE

This fungus usually grows flat, but may produce tiny brackets when on vertical surfaces. It is fairly tough and white to creamy brown with cottony white margins and teeth up to 4mm long in the center. The tube layer is 1–4mm thick and has 1–3 pores per mm; when examined under a hand lens, the pores often resemble flattened teeth.

• **OCCURRENCE** Mainly on deciduous trees, particularly beech, in woods; causes white rot. Widespread and common in northern temperate zones; cosmopolitan.

FRUITING Appears in skinlike, spreading patches on the underside of fallen branches.

Dimensions FRUITBODY ↕ 5–50cm × 2–10cm ↕ 3–7mm	Spores White	Edibility

Family CONIOPHORACEAE	Species *Coniophora puteana*	Season All year, mainly autumn

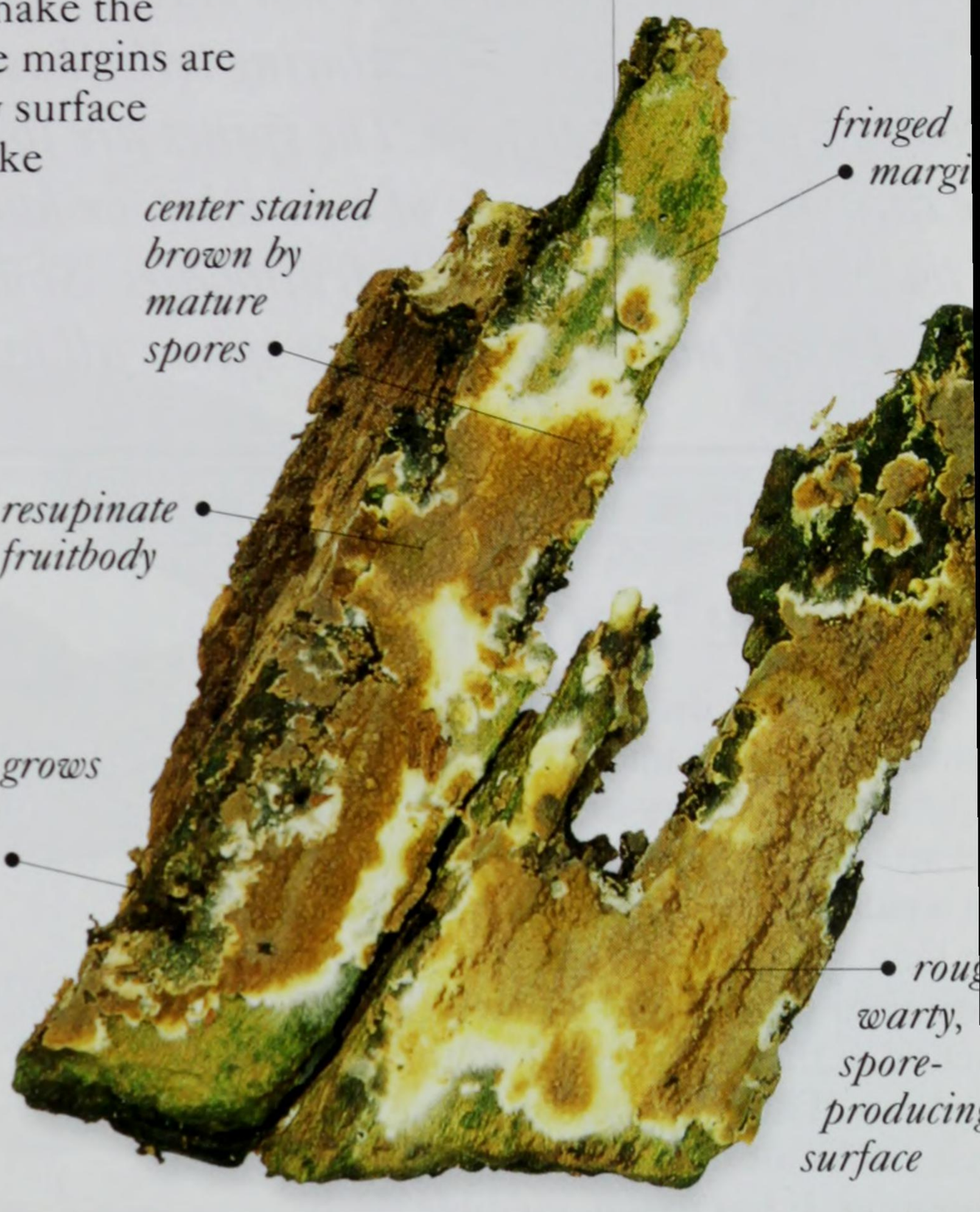
WET-ROT MUSHROOM

The spreading fruitbodies of this wet-rot fungus are soft textured and grow flattened against the substrate, never forming brackets. Maturing spores make the centers yellow to olive-brown, whereas the margins are white and fringed. Typically, the fruitbody surface becomes wrinkly and warty with age. Unlike most resupinate species, which are firmly fixed to the substrate, Wet-rot Mushroom fruitbodies can be lifted gently off.

• **OCCURRENCE** On wet wood indoors, causing wet brown rot, and on all types of wood outdoors. Widespread in the wild and in buildings, in northern temperate zones.

• **SIMILAR SPECIES** *Serpula lacrymans* (p.229) exudes droplets and may form brackets.

FRUITING Resupinate fruitbodies over substrate.



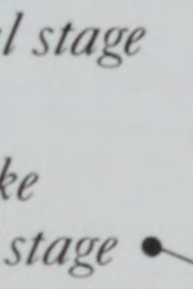
Dimensions FRUITBODY ↔ 5–100cm × 2–20cm ↕ 0.5–1mm	Spores Yellow-brown	Edibility

Family POLYPORACEAE	Species *Oligoporus rennyi*	Season Autumn

POWDER-PUFF POLYPORE

This spreading polypore is most easily recognized by its two growth stages, which occur almost simultaneously, next to each other. The resupinate, crustlike sexual stage is white at the edge, creamy white in the center, with 2–3 pores per mm. The pores become torn with age and release white spores. The asexual stage is puffball-like at first, shredding open at maturity to expose a great mass of powdery, olive-brown spores.

• **OCCURRENCE** Small patches on stumps and fallen branches of conifers; produces a brown rot in the wood. Widespread and rare to common, but usually overlooked, in northern temperate zones.

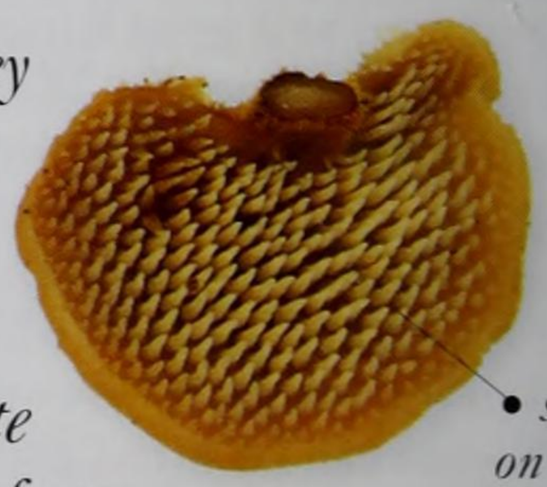


FRUITING Grows in small patches, sometir many together, along wood.

Dimensions PATCHES ↔ to 7.5cm | "PUFFBALL" ↕ ↔ 2–4cm	Spores Olive-brown/white	Edibility

FUNGI WITH SPINES

The fungi in this section are not closely related, but they all have their spore-producing cells (basidia) on a toothed or spiny surface. The spines are found under the cap, on the underside of a bracket, or hanging from the branches of coral-like fruitbodies. Some resupinate species (not featured) have spines all over their surface.



Family AURISCALPIACEAE	Species *Auriscalpium vulgare*	Season All year

PINECONE TOOTH

Among the most distinctive of fungi, this mushroom has a characteristic kidney-shaped cap, which has a furry or hairy surface with the stem attached to one side. The cap is brown with a paler margin, and its underside is hung with long, gray spines. The stem is a darker brown than the cap and has a felty covering. It is attached to the substrate by a felted pale brown mycelium. The brown coloring makes this species difficult to spot, despite the fact that it is common. It has tough, inedible flesh.

• OCCURRENCE On decaying pine and, to a lesser degree, spruce cones in needle litter, in mature conifer woods or stands. Widespread in pine, spruce, and Douglas fir forests of northern temperate zones.

FRUITING Appears singly or in pairs of fruitbodies.

Dimensions CAP ⇔ 0.5–2cm | STEM ↕ 3–10cm ↔ 2–3mm	Spores White	Edibility

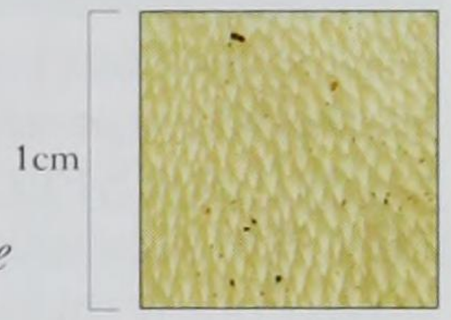
Family TREMELLACEAE	Species *Pseudohydnum gelatinosum*	Season Autumn–winter

TOOTHED JELLY

Varying in color from almost white to dark gray-brown, this bracketlike jelly mushroom has a more or less semicircular cap, with a slightly rough or downy surface, and a short, fat stem, often attached at the side. The underside is covered with pale spines. Although edible, it is not worthwhile.

• **OCCURRENCE** On rotting conifers; rarely on well-rotted deciduous stumps or fallen branches. Widespread in northern temperate zones. Also occurs in warmer regions throughout North America.

FRUITING Typically appears in groups of a few together.



SPINES

Dimensions CAP ⇹ 1–8cm | STEM ↕ 0.5–3cm ↔ 0.5–1.5cm	Spores White	Edibility

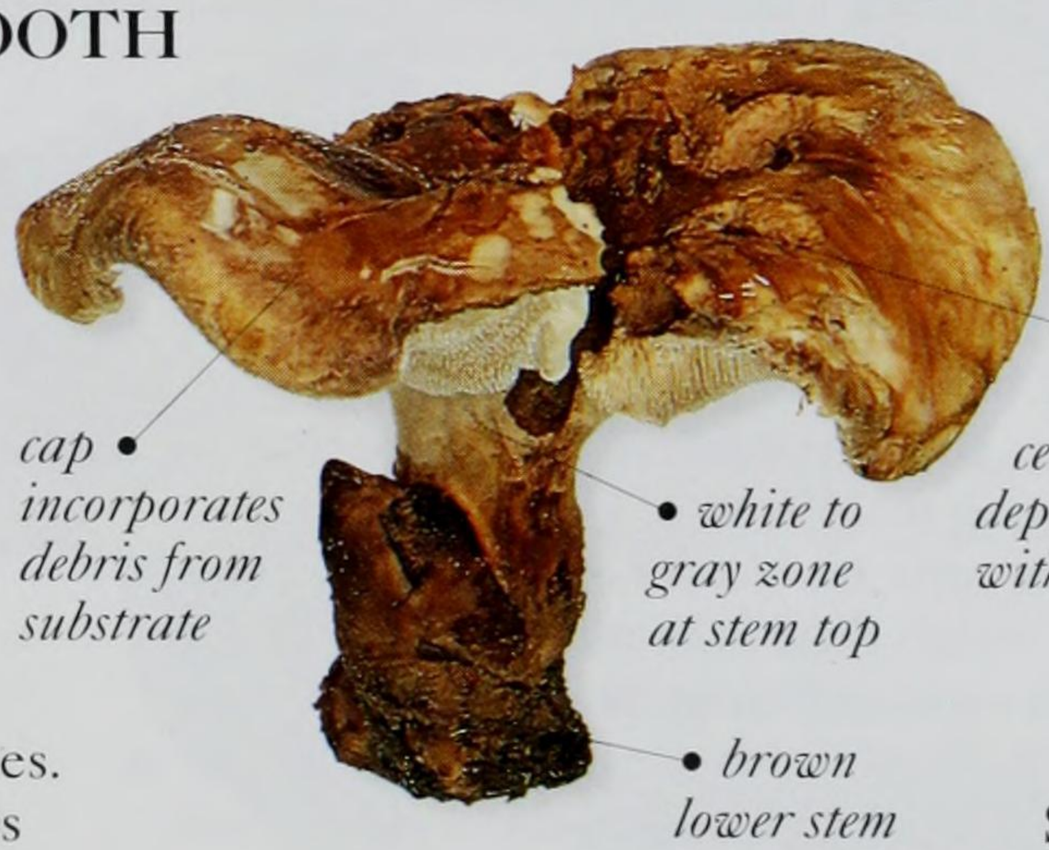
Family THELEPHORACEAE	Species *Bankera fuligineoalba*	Season Autumn

BLUSHING FRAGRANT TOOTH

Misshapen caps are common in this species because it tends to lift part of the substrate as it emerges. It has a pale brown cap, which becomes red tinged with age; the spore-bearing spines beneath are dense and gray to white. The stem is white to gray toward the top, brown at the base. The relatively soft, unzoned flesh is fragrant and turns pale pink with age.

• **OCCURRENCE** Mycorrhizal with pine. Widespread in northern temperate zones.

• **SIMILAR SPECIES** *Bankera violascens* has a clean, regularly shaped cap with lilac tints; it grows with spruce. *Sarcodon* species have colored spores.



SECTION

FRUITING Singly or in small clusters on dry, sandy soil.

Dimensions CAP ⇹ 5–10cm | STEM ↕ 2–6cm ↔ 1–3cm	Spores White	Edibility

Family THELEPHORACEAE	Species *Phellodon niger*	Season Late summer–autumn

BLACK TOOTH

Fruitbodies of this species are often fused together. The cap is flat or has a slightly depressed center and is pale gray to purplish black; in young specimens the margin is a distinct pale blue. The spines are blue-gray at first, turning gray. The leathery black flesh smells of curry.

• **OCCURRENCE** Mycorrhizal with conifers in woods or stands, sometimes among deciduous trees, on calcareous soil. Widespread but local in northern temperate zones.

• **SIMILAR SPECIES** *Phellodon melaleucus* smells similar but is thinner, paler, and less felty. It is found on poor, acidic soil in woods.

FRUITING Singly or in dense clusters among moss.

Dimensions CAP ⟷ 3–10cm | STEM ↕ 2–5cm ↔ 0.5–2cm	Spores White	Edibility

Family THELEPHORACEAE	Species *Phellodon tomentosus*	Season Late summer–autumn

FUNNEL TOOTH

This tooth fungus has a centrally depressed cap with the surface marked in zones of shades of brown, vertical spines on the underside, and a fibrous dark brown stem. The growing margin on the cap is thin and white, and caps are often fused together. The inedible, tough flesh is thin and brown. Dried fruitbodies smell of curry or fenugreek.

• **OCCURRENCE** Mycorrhizal with conifers or, rarely, deciduous trees in woods, on sandy soil. Widespread but local in northern temperate zones.

• **SIMILAR SPECIES** A range of tooth fungi look fairly similar, including some species of *Hydnellum* (see p.237), which have brown spores. *Phellodon confluens* has a more felty surface, has fewer zones, and is paler in color with more irregularly shaped caps.

FRUITING In groups among mosses and lichens.

Dimensions CAP ⟷ 2–6cm | STEM ↕ 2–5cm ↔ 4–7mm	Spores White	Edibility

Family THELEPHORACEAE	Species *Hydnellum peckii*	Season Autumn

BLOODY TOOTH

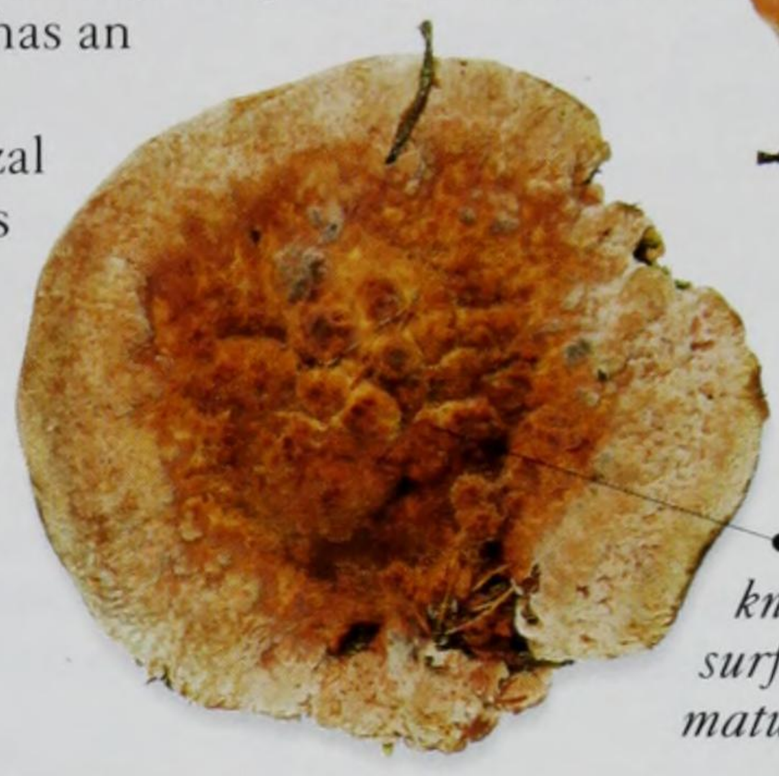
The cap of this fleshy species is flat to depressed with a knobby surface and a spiny underside. It is velvety white at first, darkened by blood-red droplets exuded as the fruitbody grows. Later it becomes brown with wine-red tinges. The tapering stem is a similar color. The corky brown flesh has an extremely unpleasant taste.

• **OCCURRENCE** Mycorrhizal with pine and spruce in woods and stands, including sand dunes planted with pine. Widespread but local in northern temperate zones.

• **SIMILAR SPECIES** *Hydnellum ferrugineum* has a mild taste. Other species do not develop the red droplets.

spore-bearing surface has spines 3–4mm long

blood-red droplets in young, growing specimens



dark, knobbly surface of mature cap

FRUITING In small clusters in moss or lichen.

Dimensions CAP ⊕ 3–7cm | STEM ↕ 1–6cm ↔ 0.5–2cm	Spores Brown	Edibility

Family THELEPHORACEAE	Species *Sarcodon scabrosus*	Season Autumn

BLUE-FOOTED SCALY TOOTH

In common with all members of the genus, this species is large and fleshy. Its often centrally depressed cap has an uneven, scaly, dark brown surface, and its stem is dark brown with a steel-blue base. The pale flesh has a cheesy texture and yeasty smell. Most *Sarcodon* species taste bitter, but some, like *S. imbricatum*, can be enjoyed by many people after they are thoroughly cooked.

• **OCCURRENCE** Mycorrhizal with trees in both deciduous and coniferous woodland. Widespread but local to rare in northern temperate zones. *Sarcodon* species are on the decline; several are considered to be endangered.

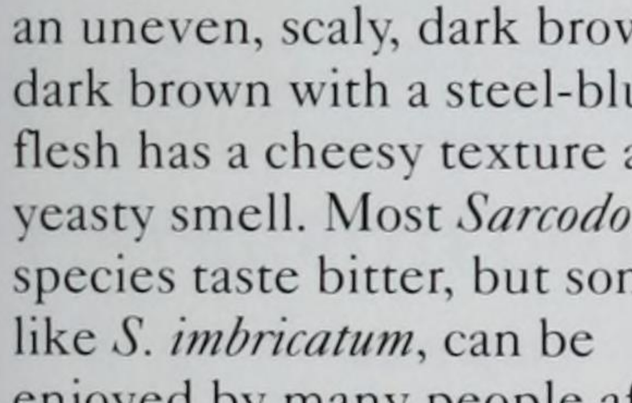
• **SIMILAR SPECIES** *S. glaucopus* has a smoother cap and a blue stem base.

dark brown scales on cap surface

spines are purple-brown with pale tips

short, thick stem is steel-blue at base

△ *SARCODON IMBRICATUM* This brown species does not have a blue stem base. It has a scaly cap, to 20cm across, and mild to sharp flesh.



FRUITING Appears in clusters or rings.

Dimensions CAP ⊕ 4–14cm | STEM ↕ 3–8cm ↔ 1–3.5cm	Spores Brown	Edibility

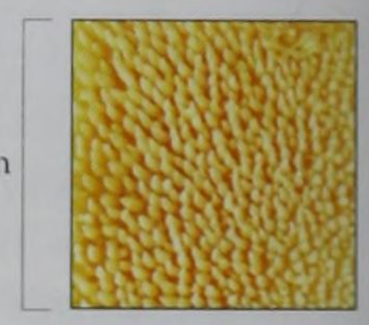
Family HYDNACEAE	Species *Hydnum repandum*	Season Autumn

COMMON HEDGEHOG TOOTH

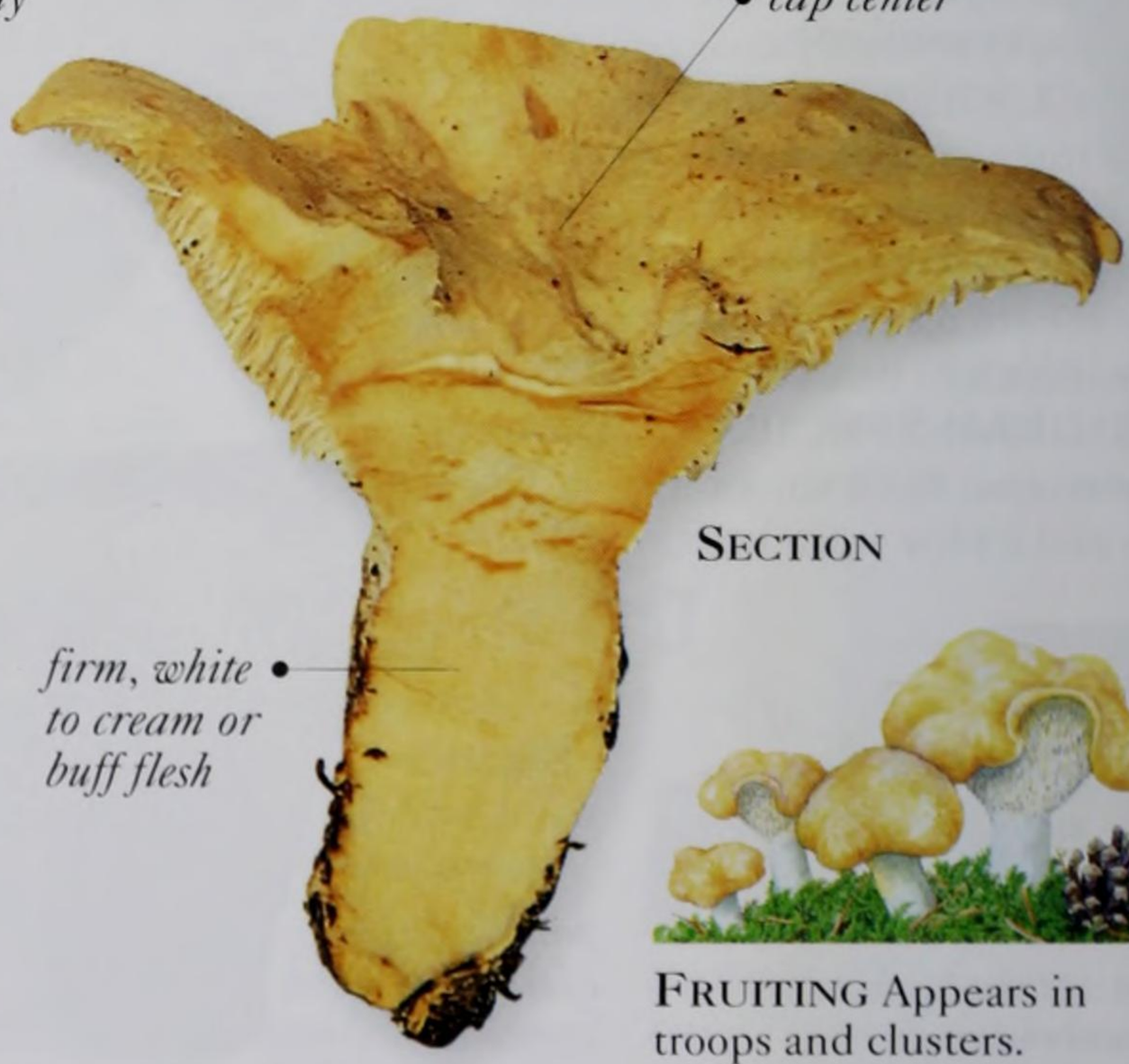
This very fleshy fungus has a massive, slightly off-center stem and a large, convex or centrally depressed cap, which is often irregular in shape. It has a smooth or slightly felty upper surface and fragile spines on the underside. Pale cream to ocher in color, the whole fruitbody stains orange with age and when bruised. This is a choice edible; older specimens should be cooked thoroughly, as the flesh can become bitter with age.

• **OCCURRENCE** Mycorrhizal with both deciduous trees and conifers in woods. Widespread in northern temperate zones, including cold regions.

• **SIMILAR SPECIES** *Hydnum albidum* has a white cap, smaller spores, and occurs on alkaline soil. Closely related *H. rufescens* is smaller and orange.



CAP UNDERSIDE



SECTION

△ *HYDNUM UMBILICATUM*
This is a choice edible that resembles the Common Hedgehog Tooth, but is smaller, thinner, typically orange, and has a hole or cavity in the center of the cap. Widespread in North America.

FRUITING Appears in troops and clusters.

Dimensions CAP ⇔ 5–15cm | STEM ↕ 3–7cm ↔ 1–3cm	Spores White	Edibility

Family HERICIACEAE	Species *Hericium coralloides*	Season Late summer–late autumn

CORAL TOOTH

When it is spotted growing along a fallen trunk or similar substrate, this fungus is a breathtaking sight, with its off-white to dirty yellow fruitbody consisting of numerous brittle, coral-like branches, the lower surfaces of which are densely covered with long, pendent spines. The off-white or cream flesh has the texture of fresh crabmeat and greatly resembles it in appearance and taste when shredded and cooked.

• **OCCURRENCE** Found growing on fallen or standing, dead deciduous trees, such as beech and birch. Widespread in northern temperate zones; locally fairly common.

FRUITING Singly or in groups along dead trunks.

Dimensions FRUITBODY ↔ 10–40cm × 5–20cm ↕ 10–30cm	Spores White	Edibility

Family HERICIACEAE	Species *Creolophus cirrhatus*	Season Autumn

LAYERED TOOTH

This species has a layered, fleshy, semicircular fruitbody, which is creamy white and develops in tiers. The underside has long, pendent spines; the upper surface is felty. Although the thick, soft flesh is edible and smells and tastes pleasant, the species is rare so should not be gathered. It belongs to a very small genus, related and similar to *Hericium* (above).

• **OCCURRENCE** Mainly on deciduous trees, in woods. Widespread, in northern temperate zones.

• **SIMILAR SPECIES** The inedible huge *Climacodon septentrionalis* has more regular and larger brackets and finer spines underneath. It is found in northeastern Europe, Japan, Siberia, and northeastern North America to Tennessee.

FRUITING Appears in tiers on stumps or, rarely, trunks.

Dimensions FRUITBODY ↔ 10–20cm ↕ to 10cm thick	Spores White	Edibility

CLUB-SHAPED FUNGI

The species in this section have more or less club-shaped fruitbodies. In most of those featured, the fruitbody is fertile over its entire surface, or the base may be sterile. In the flask-fungi (see p.244), the spore-producing surface (hymenium) is in tiny, flask-shaped fruitbodies embedded in a fleshy, club-shaped structure (stroma).

SMOOTH OR HAIRY

SPECIES FEATURED HERE have club-shaped fruitbodies with a smooth or hairy surface. (For species with a pimply or dusty surface, see p.244.) They vary from the very slender *Typhula* species to the much thicker *Clavariadelphus pistillaris* (p.241). Some, such as *Leotia lubrica* (p.243), have well-defined fertile heads, but in most, the fertile part merges with the stem.

Family CLAVARIACEAE	Species *Clavulinopsis helvola*	Season Autumn

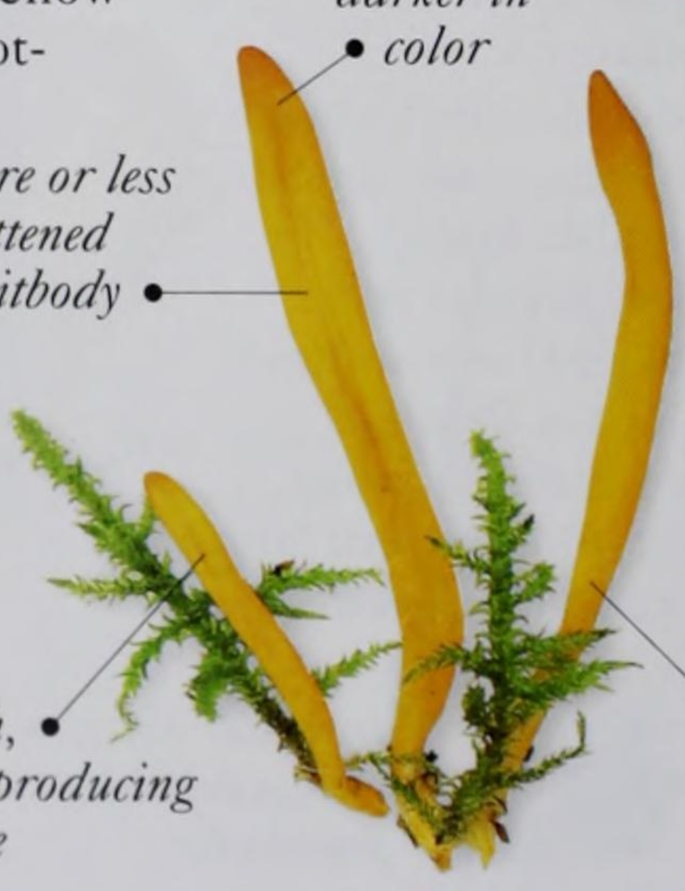
YELLOW SPINDLE CORAL

Just one of several unbranched, club-shaped yellow species in this genus, Yellow Spindle Coral can be correctly identified only by examining the spores under a microscope: they have prominent warts on them, unlike the smooth spores of other members. The pale yellow flesh is rather brittle and odorless.

• **OCCURRENCE** In moss-rich meadows, mature lawns, and some wooded areas. Widespread in temperate regions of south-east Asia; common in Europe and northeastern North America.

• **SIMILAR SPECIES** *Clavulinopsis fusiformis* has large clubs and tends to grow in dense clusters. *C. laeticolor* is odorless and yellow to orange-yellow. *C. luteoalba* is apricot-orange and has a musty smell. *Clavaria angillacea* is dull yellow-brown and grows on heathland.

FRUITING Appears singly or a few together in small groups.



△ *CLAVARIA VERMICULARIS* This species produces tufts of unbranched, club-shaped white fruitbodies. The tip of the club often dries yellow or tan. Fragile with brittle flesh, the fruitbody is hollow and may flatten as it ages.

Dimensions CLUB ↕ 3–7cm ↔ 2–4mm	Spores White	Edibility

Family CLAVARIACEAE	Species *Clavariadelphus pistillaris*	Season Autumn

GIANT CLUB CORAL

An impressive size for a club-fungus, this species is lemon flushed when young but becomes dull tan with age as the spores mature on the fruitbody surface. When bruised it stains reddish brown. Firm at first, becoming soft and spongy with age, the white flesh smells fairly pleasant but has a bitter taste.

• **OCCURRENCE** Found in woodland, often with beech. Widespread in northern temperate regions; local but can be common where habitats are suitable.

• **SIMILAR SPECIES** *Clavariadelphus ligula* and *C. sachalinensis* are smaller and less distinctly club-shaped; both occur with conifers. *C. truncatus* has a flat top and a sweet taste; it occurs in coniferous woods on rich soil.

FRUITING Appears in troops on soil among leaf litter in calcareous woodland.

Dimensions CLUB ↕ 10–20cm ↔ 2–6cm	Spores White to pale yellow	Edibility

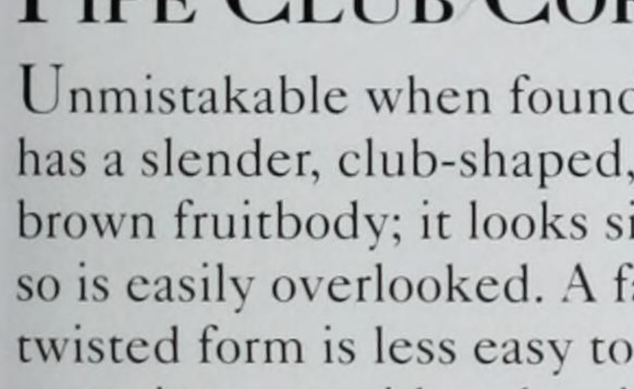
Family CLAVARIACEAE	Species *Macrotyphula fistulosa*	Season Late autumn

PIPE CLUB CORAL

Unmistakable when found, the Pipe Club has a slender, club-shaped, yellow to tawny-brown fruitbody; it looks similar to a leaf stalk so is easily overlooked. A fairly stunted and twisted form is less easy to identify and is sometimes considered an independent species, *Macrotyphula contorta*.

• **OCCURRENCE** On buried deciduous wood in damp leaf litter, especially among beech trees. Widespread in northern temperate regions and subarctic areas; across northern North America.

• **SIMILAR SPECIES** The closely related *M. juncea* has much thinner fruitbodies. It is common in damp woods and grows on leaf litter.



FRUITING Appears singly on decaying sticks.

Dimensions CLUB ↕ 5–20cm ↔ 2–8mm	Spores White	Edibility

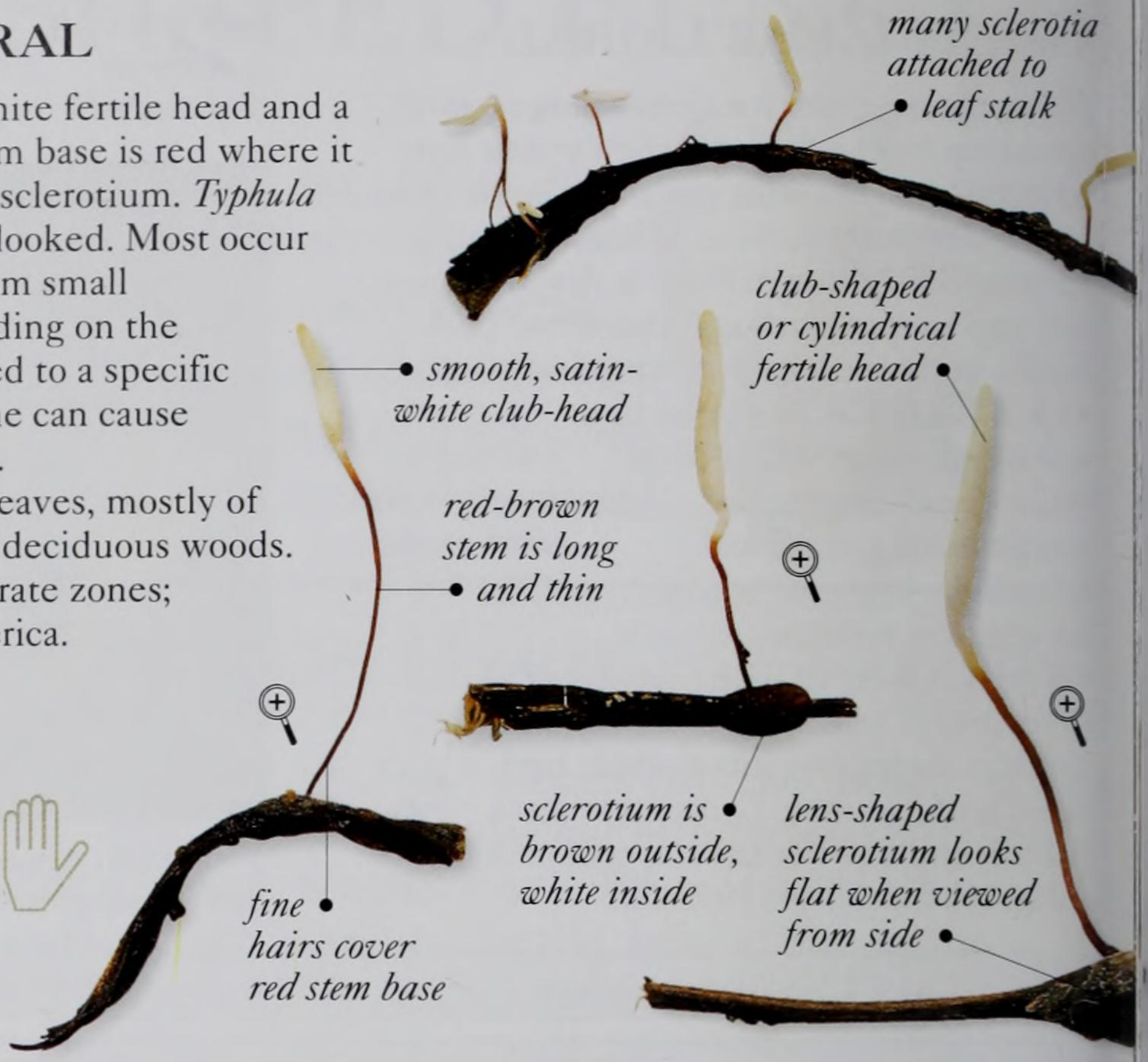
Family CLAVARIACEAE	Species *Typhula erythropus*	Season Autumn–early winter

TUBER CLUB CORAL

This tiny club-fungus has a white fertile head and a long, red-brown stem. The stem base is red where it emerges from an underground sclerotium. *Typhula* species are tiny and often overlooked. Most occur late in autumn and develop from small overwintered sclerotia. Depending on the species, these are often attached to a specific substrate such as bracken. Some can cause severe damage to certain crops.

• **OCCURRENCE** On fallen leaves, mostly of ash, maple, and alder, in damp deciduous woods. Widespread in northern temperate zones; common in eastern North America.

FRUITING Appears singly or in small groups.



Dimensions CLUB ↕ 0.5–3cm ↔ 1–2mm	Spores White	Edibility

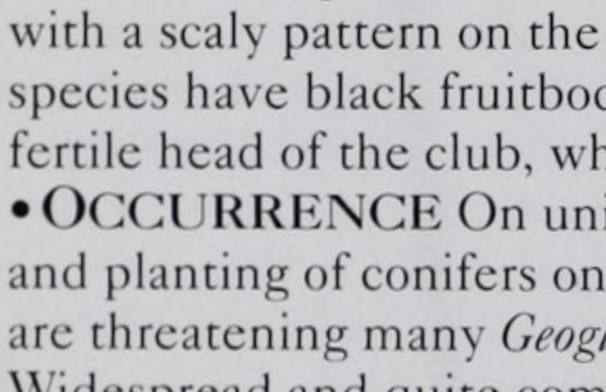
Family GEOGLOSSACEAE	Species *Geoglossum fallax*	Season Autumn

SCALY EARTH-TONGUE ASCO

The club-shaped fruitbody of the Scaly Earth-tongue is dark brown with a scaly pattern on the upper part of the stem; most *Geoglossum* species have black fruitbodies. The spores are produced in the fertile head of the club, which is lined with the hymenium.

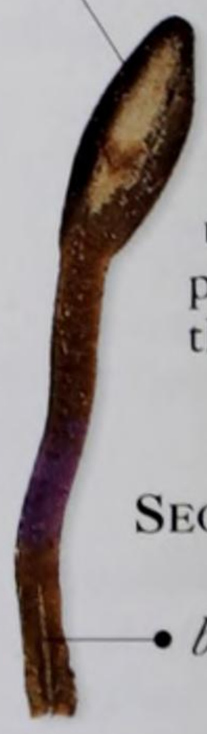
• **OCCURRENCE** On unimproved grassland; the use of fertilizers and planting of conifers on marginal lands are threatening many *Geoglossum* species. Widespread and quite common throughout Europe and eastern North America, although easily overlooked.

• **SIMILAR SPECIES** *Trichoglossum* species are distinguished by stiff hairs, which are embedded in the flesh and penetrate the surface like bristles.



FRUITING In small groups in moss or hidden in tall grass.

△ *TRICHOGLOSSUM HIRSUTUM*
This species has a club-shaped, bristly black fruitbody. The upper part contains asci producing long spores; the stem is sterile.



Dimensions CLUB ↕ 3–7cm ↔ 3–7mm	Spores Dark brown	Edibility

Family LEOTIACEAE	Species *Leotia lubrica*	Season Autumn

JELLY BABIES ASCO

This distinctive species produces a small, pestle-shaped fruitbody with a rubbery texture and gelatinous flesh. The well-defined, convex, lobed head is greenish yellow with a clear, recurved margin and contains the spore-producing tissue. The orange-yellow stem is covered with minute green scales or dots and is often hollow. *Leotia lubrica* can develop a blackish green hue as a result of a fungal infection, but even healthy specimens often turn olive-green when they are fully mature.

• **OCCURRENCE** Found growing in damp woods among leaf litter and moss. Widespread and common in most northern temperate zones; cosmopolitan.

FRUITING Appears in clusters, often in large troops.

SECTION

Dimensions CLUB ↕ 2–5cm ↔ 0.3–1cm	Spores White	Edibility

Family GEOGLOSSACEAE	Species *Mitrula paludosa*	Season Early summer–autumn

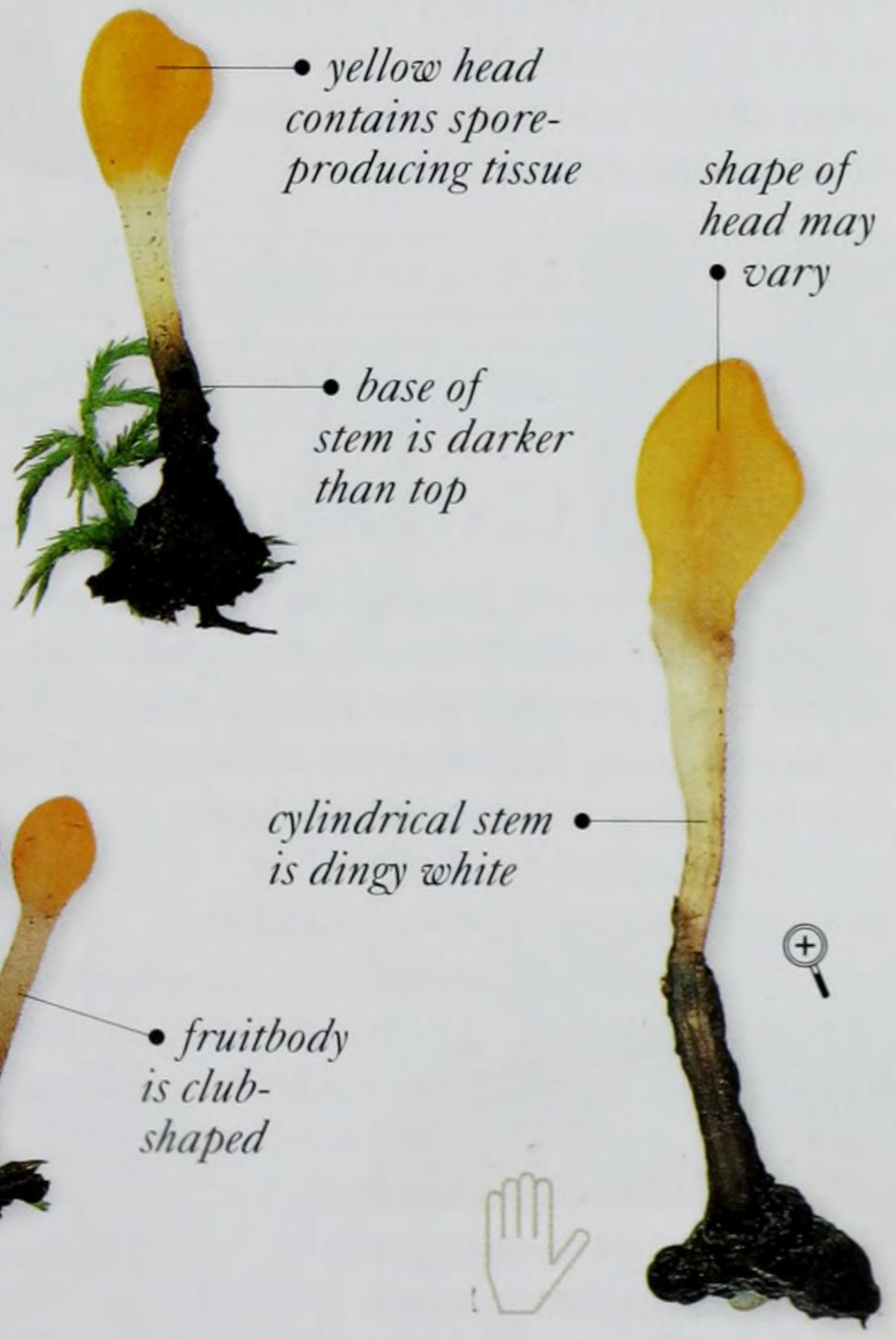
BOG BEACON ASCO

With its glistening orange head and cylindrical white stem, this attractive, club-shaped mushroom is very aptly named. It has a smooth surface and watery, soft, yellow flesh. The club head contains the spore-bearing hymenium; the stem is sterile.

• **OCCURRENCE** In unpolluted, stagnant water with leaf litter. Prefers northern areas and higher altitudes in northern temperate zones.

• **SIMILAR SPECIES** *Bryoglossum rehmii* is found in drier areas and placed in the Leotiaceae family (above, pp.269, 271–73). *Heyderia* species are smaller and mostly occur on needle litter. *Spathularia flavida*, also found on needle litter, has a very flat, somewhat lobed, head.

FRUITING In small or large troops of fruitbodies.



Dimensions CLUB ↕ 2–5cm ↔ 0.2–1cm	Spores White	Edibility

WITH PIMPLES OR A DUSTY SURFACE

THE FUNGI in this subsection are mainly characterized by their pimply surface. The pimples are caused by flask-shaped fruitbodies embedded in the fleshy tissue (stroma). They are visible when the club is cut in half lengthwise. One species featured here, *Paecilomyces farinosus* (below), produces masses of loose, asexual spores on its surface, making it look dusty.

Family CLAVICIPITACEAE	Species *Cordyceps militaris*	Season Summer–autumn

ORANGE CATERPILLAR ASCO

This parasitic flask-fungus emerges from its host as a club-shaped, orange-red composite fruitbody, called a stroma. The spore-producing asci are contained in flasks seen as spikes breaking through the surface on the upper region of the club, which is slightly swollen. The spores themselves are long and cylindrical and break into segments. The stem is smooth and paler in color.

• **OCCURRENCE** Mycelia invade and kill the larvae and pupae of moths, either in woods or grassland. Widespread in northern temperate zones. Other *Cordyceps* species parasitize insects, spiders, or *Elaphomyces* truffles (p.259). The majority are tropical.

• **SIMILAR SPECIES** *C. bifusispora*, which is also parasitic on moths, is more yellow and has spores with club-shaped end cells.

FRUITING Appear singly or in small groups.

Dimensions CLUB ↕ 2–5cm ↔ 3–8mm	Spores White	Edibility

Family CLAVIVIPITACEAE	Species *Paecilomyces farinosus*	Season Summer–autumn

COTTON CATERPILLAR ASCO

Thought to be the asexual stage of *Cordyceps militaris*, this fungus attacks the larvae and pupae of moths and, after consuming the host, produces erect, club-shaped structures. These may be orange or yellow, but their color is obscured by fluffy white masses of asexual spores (conidia), which are easily detached.

• **OCCURRENCE** Always grows on buried or partially buried larvae and pupae of moths, both in open grassy areas and in woodland. Widespread and common in northern temperate zones.

FRUITING Appears singly or in small groups from the larvae and pupae of moths.

Dimensions CLUB ↕ 2–5cm ↔ 2–5mm	Spores White	Edibility

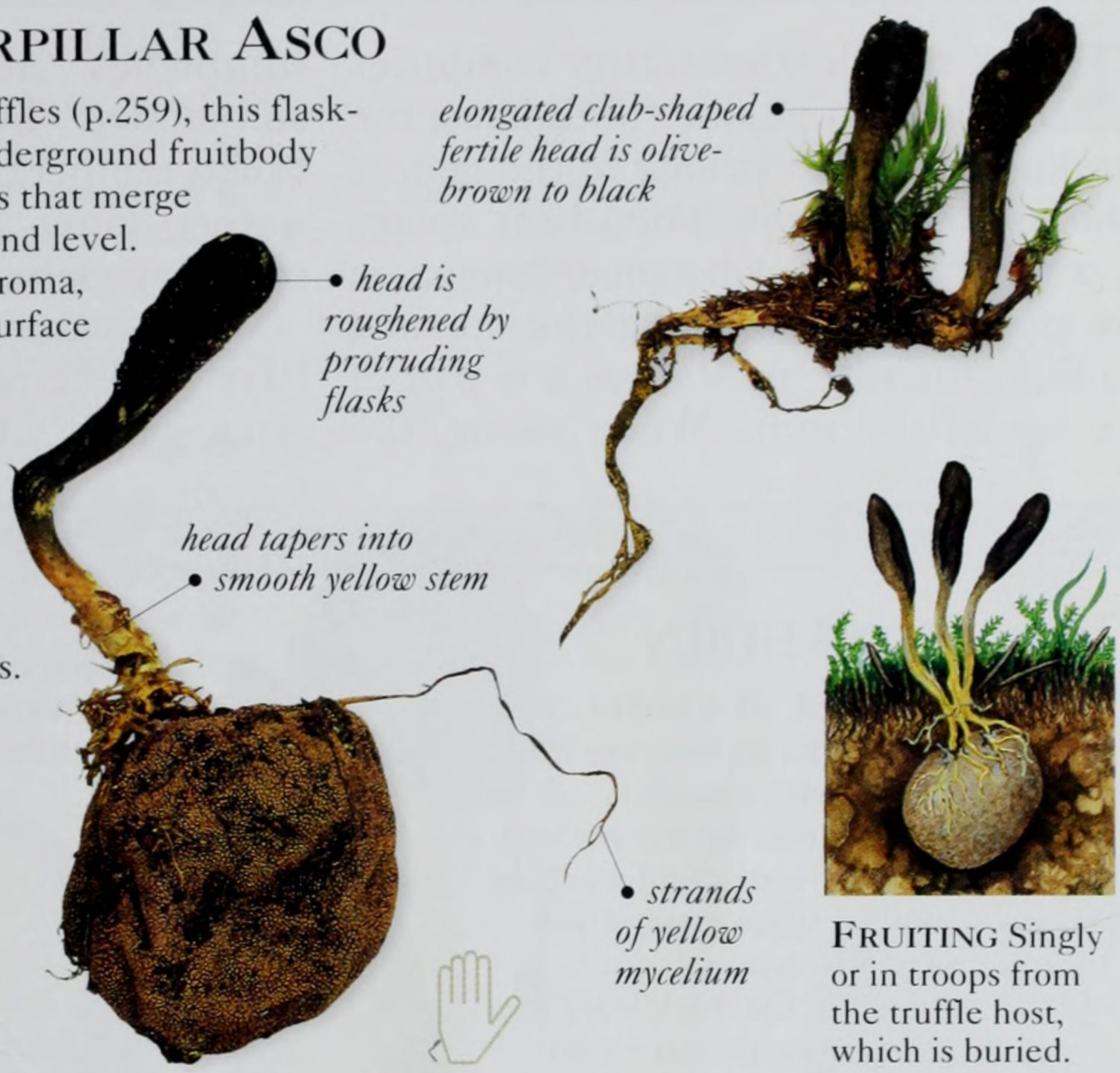
Family CLAVICIPITACEAE	Species *Cordyceps ophioglossoides*	Season Autumn–early winter

TRUFFLE CATERPILLAR ASCO

Parasitic on *Elaphomyces* truffles (p.259), this flask-fungus is attached to the underground fruitbody of the host by yellow threads that merge to form the stem above ground level. The head of the club, the stroma, is olive-brown to black; its surface is roughened by tiny flasks embedded in the yellow-brown flesh and containing spore-producing asci.

• **OCCURRENCE** Parasitic on *Elaphomyces muricatus* or *E. granulatus* in conifer and deciduous woods. Widespread and locally common in northern temperate zones.

• **SIMILAR SPECIES** *Cordyceps capitata* and *C. longisegmentatis*, both with rounded heads, can also occur on the same host as *C. ophioglossoides*.



FRUITING Singly or in troops from the truffle host, which is buried.

Dimensions CLUB ↕ 5–13cm including root ↔ 0.5–1cm	Spores White	Edibility

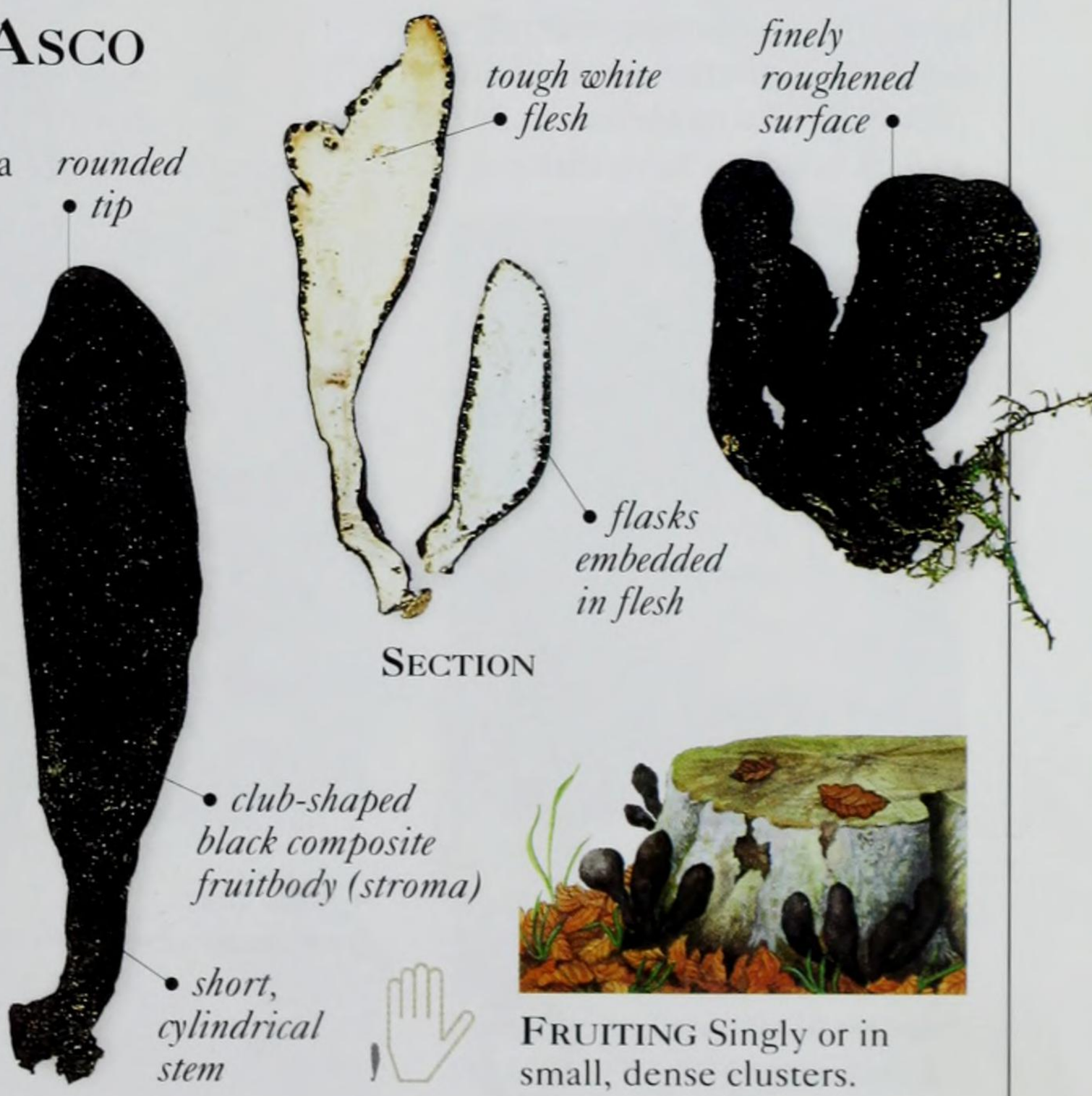
Family XYLARIACEAE	Species *Xylaria polymorpha*	Season Summer–winter

DEAD-MAN'S FINGERS ASCO

This well-known flask-fungus has club-shaped composite fruitbodies, or stromata with thick white flesh. Each has a short, cylindrical stem and a rounded tip. Just below the surface and embedded in the flesh are flask-shaped organs that contain the spore-producing asci. The asci eject the long, mature spores by force through a tiny opening in the top of the flask, the ostiole.

• **OCCURRENCE** Often found at soil level attached to rotten wood such as tree stumps, especially of beech and elm trees but also birch and linden. Widespread and rather common in northern temperate zones, its range extending to the subtropics.

• **SIMILAR SPECIES** The more slender *Xylaria longipes*, which also has shorter spores, is largely confined to dead deciduous wood in northern temperate zones.



FRUITING Singly or in small, dense clusters.

Dimensions CLUB ↕ 3–10cm ↔ 1–4cm	Spores Black	Edibility

PHALLUS-SHAPED

THIS SMALL SUBSECTION comprises fungi with phallic fruitbodies, the Stinkhorns, which belong to the genera *Phallus* and *Mutinus*. They bear spores in a sticky, slimy substance, known as the gleba. In *Phallus* the gleba sits on a caplike structure; in *Mutinus* it is part of the top of the stem. When young, the fruitbodies are egg-shaped and are surrounded by a skinlike structure called the peridium. It has a gelatinous, watery inner layer that protects the maturing gleba.

When mature, all fungi in this group have a penetrating putrid smell. This attracts flies, which aid spore dispersal.

Family PHALLACEAE	Species *Mutinus caninus*	Season Summer–autumn

DOG STINKHORN

The long-stemmed, off-white to dirty orange fruitbody of this species emerges from an egg-shaped structure with a leathery, off-white skin. The orange stem tip merges with the stem. It is covered with a foul-smelling slimy, olive-green spore mass, which attracts insects for dispersal.

• **OCCURRENCE** On thick leaf litter or needle litter, often around rotten stumps, in conifer and deciduous woods. Fairly common in Europe; worldwide distribution unclear.

• **SIMILAR SPECIES** *Mutinus elgans*, from North America but also spreading in Europe, has red stem coloring. It prefers gardens and parks. *Phallus impudicus* (p.247) and its relatives have distinct caps at the stem tip.

Dimensions FRUITBODY ↕ 6–12cm ↔ 1–1.5cm	Spores Olive-green	Edibility

Family PHALLACEAE	Species *Phallus impudicus*	Season Summer–autumn

SHAMELESS STINKHORN

This species is often smelled before it is seen; members of the Phallaceae family are famous for their foul-smelling fruitbodies, which attract insects to disperse the spores. Mature specimens are easy to recognize by their phallic shape, formed by the white stem and the slimy, olive-green cap. Young fruitbodies are enclosed in an egglike structure with a thin, leathery skin that breaks open as the stem emerges. The section that becomes the stem is edible and can be extracted from the egg.

• **OCCURRENCE** In acidic conifer or deciduous woods and in sand dunes. Widespread and common in areas of northern temperate zones.

• **SIMILAR SPECIES** *Phallus ravenellii* is the common eastern North America species, differing by minor characteristics. *P. duplicatus* (inset, below).

beneath slime, cap is honeycomb-like and white

thimble-shaped cap

spores are contained within olive-green slime covering cap

stem just about to emerge from egg

SECTION

thick white cord anchors egg to substrate

spongy white stem has a cellular structure and is hollow

intact egg 4–7cm high and 3–5cm wide

egg skin around base is thin and leathery

FRUITING Appears singly or in small troops on acidic soil.

△ *PHALLUS DUPLICATUS*
This species has a distinctive, delicate, netted white skirt of tissue that flares out from beneath the base of the slime-covered, dark green cap. |◎|

Dimensions FRUITBODY ↕ 15–20cm ↔ 1.5–3cm	Spores Olive-brown	Edibility |◎|

ANTLER- TO CORAL-LIKE FUNGI

These species are an elaboration of the club-shaped mushrooms on pp.240–45. Some have only a few branches; others are more complex. In most cases, the branches are entirely covered with spore-bearing tissue, but those of Sparassis crispa *(p.252) are fertile on one side only, and* Xylaria hypoxylon *is a flask-fungus (see p.244).*

Family XYLARIACEAE	Species *Xylaria hypoxylon*	Season All year

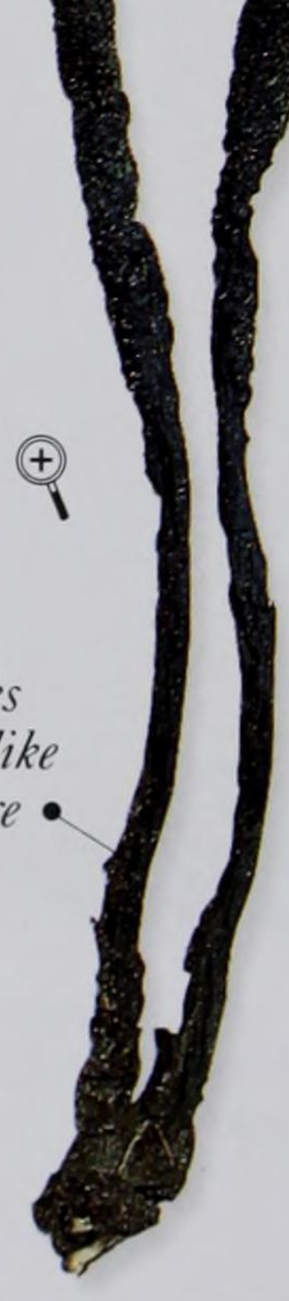
CARBON ANTLER ASCO

The young stromata, or composite fruitbodies, of this flask-fungus are very striking. Antler-shaped and white-powdered from asexual spores (conidia), they stand out strikingly on their deciduous stump substrate. The sexual spores develop within tiny, flask-shaped fruitbodies in the outer part of the stromata. By late autumn they have turned the stromata coal-black, and the tips have withered. The flesh is white, in common with most species of *Xylaria*.

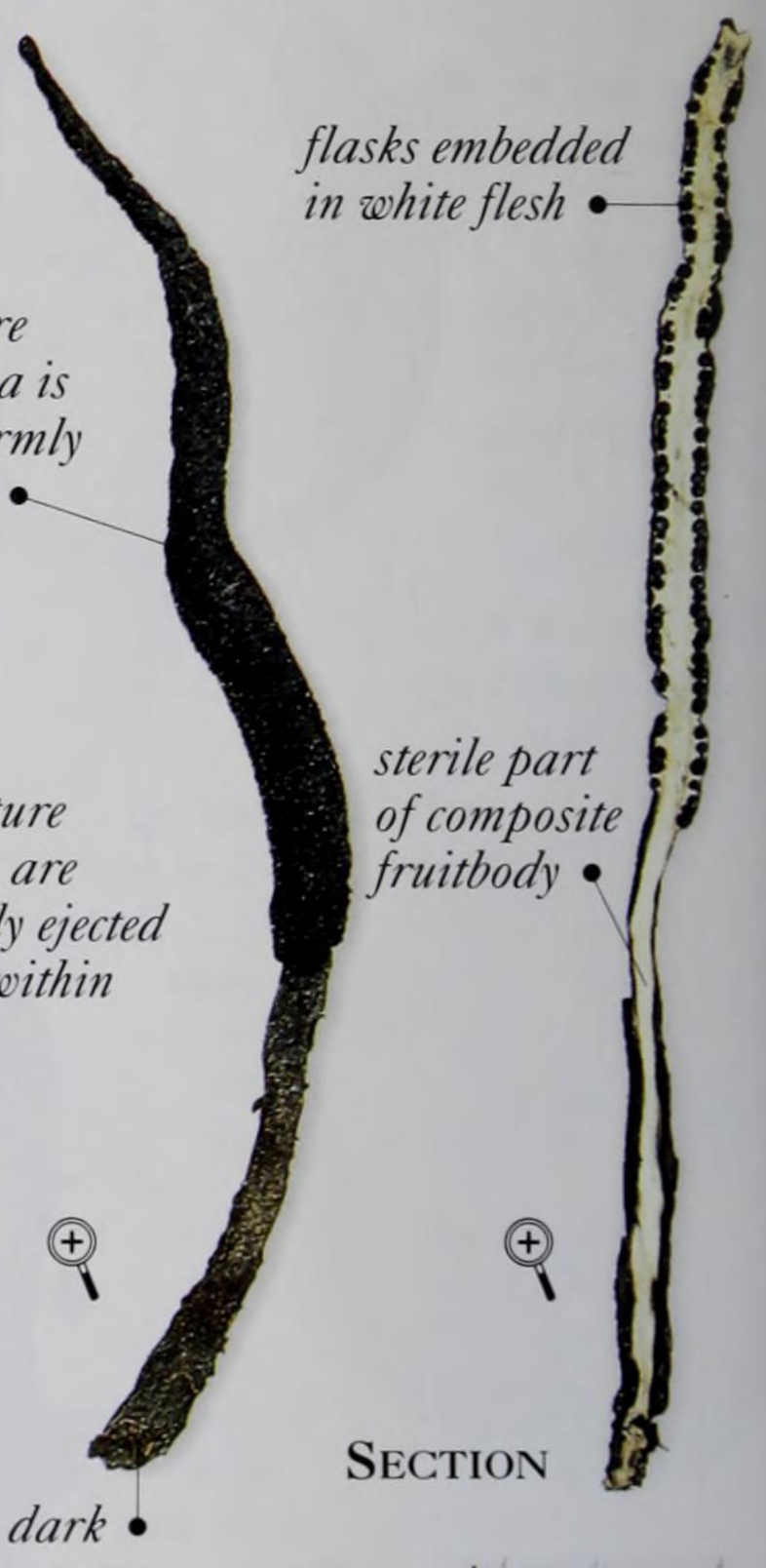
• **OCCURRENCE** On deciduous trees especially on stumps, in parks and forests. Widespread and common throughout northern temperate zones.

• **SIMILAR SPECIES** *X. mellisii* is typically more branched when mature or has smoother stromata. It occurs in greenhouses and subtropical climates.

ASEXUAL STATE



SEXUAL STATE



SECTION

FRUITING Appears in small, conspicuous groups.

Dimensions COMPOSITE FRUITBODY ↕ 1–6cm | BRANCH ↔ 1–4mm × 0.5mm	Spores Black	Edibility

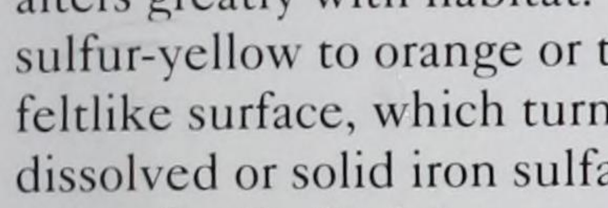
Family CLAVARIACEAE	Species *Clavulinopsis corniculata*	Season Late autumn

MEADOW CORAL

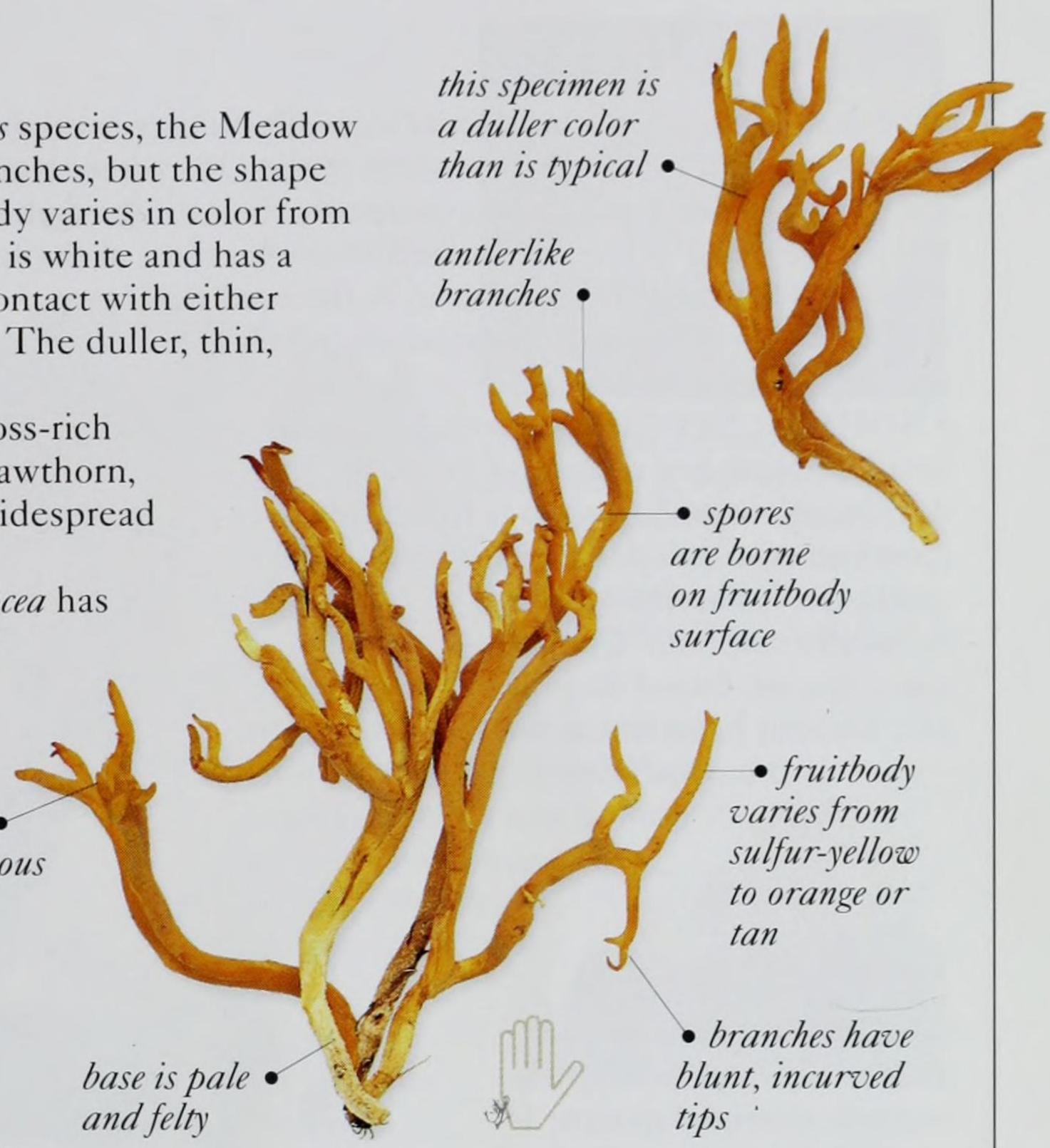
One of the more common *Clavulinopsis* species, the Meadow Coral typically has many antlerlike branches, but the shape alters greatly with habitat. The fruitbody varies in color from sulfur-yellow to orange or tan; the base is white and has a feltlike surface, which turns green in contact with either dissolved or solid iron sulfate ($FeSO_4$). The duller, thin, rather fragile flesh has a yeasty smell.

• **OCCURRENCE** In unimproved, moss-rich meadows, in some coastal scrub with hawthorn, and in damp, ash-dominated woods. Widespread in temperate regions.

• **SIMILAR SPECIES** *Ramariopsis crocea* has more pointed tips, is more golden, and does not react with $FeSO_4$. It typically occurs in woods.



FRUITING Appears singly or in small troops.



Dimensions FRUITBODY ↕ 2–8cm | BRANCH ↔ 0.5–2cm	Spores White	Edibility

Family CLAVULINACEAE	Species *Clavulina cristata*	Season Summer–early winter

CRESTED CORAL

This familiar fungus varies greatly in overall shape and color but is easily recognizable due to its many fairly thick, often fused branches with distinctive crested tips. White and gray forms exist but they can hardly be distinguished from one another since intermediate shades also occur. The rather fragile flesh is white. Members of the very small Clavulinaceae family have relatively large basidia, each usually bearing only two spores on strongly curved, hornlike sterigmata (see pp.10–11).

• **OCCURRENCE** Found in damp places, such as ditch banks in forests, and on roadside shoulders. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *Clavulina rugosa* is typically taller, wrinkled, and has fewer branches. *Ramariopsis kunzei* has branch tips that are not crested or fringed.

FRUITING Appears singly or in small groups.

Dimensions FRUITBODY ↕ 2–6cm ↔ 0.5–3cm	Spores White	Edibility

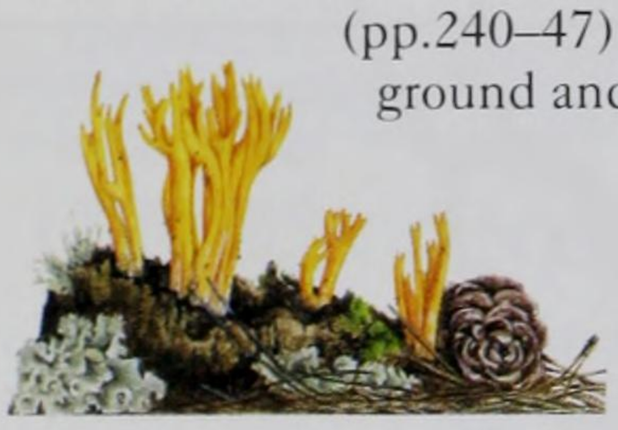
Family DACRYOMYCETACEAE	Species *Calocera viscosa*	Season Autumn–winter

ANTLER JELLY

The many-branched fruitbody of this jelly-fungus is bright orange with tough, rubbery flesh. Members of the Dacryomycetaceae family are distinguished under a microscope by their tuning-fork-shaped basidia (see pp.10–11); spores are borne over most of the fruitbody.

• **OCCURRENCE** Only on dead or decayed wood of conifers. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *Calocera cornea* has small, unbranched clubs and grows on deciduous twigs. *C. furcata* is forked and grows on pine wood. Paler *C. pallido-spathulata* is flattened and irregular; it can be locally common. *Gymnosporangium clavariiforme*, found on juniper, is less erect and without branches at the tips. Club-fungi (pp.240–47) grow mostly on the ground and are more fragile.



FRUITING Appears singly or in small, clustered groups.

Dimensions FRUITBODY ↕ 3–10cm ↔ 0.5–4cm	Spores Yellow	Edibility

Family RAMARIACEAE	Species *Ramaria abietina*	Season Autumn

GREENING CORAL

The verdigris coloring that stains the whole fruitbody of this fungus as it ages makes it easy to identify among the small, less fleshy *Ramaria* species. It is densely branched and dull brown to olive-brown when it first emerges, slowly turning green. The flesh is dull pale brown and fairly firm.

• **OCCURRENCE** On thick needle beds under conifers, especially spruce. Widespread throughout conifer forests of northwestern North America.

• **SIMILAR SPECIES** Larger *R. apiculata* is green on the branch tips only. *R. eumorpha*, *R. flaccida*, and *R. myceliosa*, among others, are similar but do not stain green.

FRUITING Almost always found in fairy rings.

Dimensions FRUITBODY ↕ 3–8cm ↔ 1.5–4cm	Spores Ocher	Edibility

Family RAMARIACEAE	Species *Ramaria botrytis*	Season Autumn

PINK-TIPPED CORAL

Dense, white to pale brown branches with purple tips help to identify this fungus, which is typically very fleshy. The lower part of the stem is very thick and stubby. The white flesh is firm with a pleasant, fruity smell, but eating it cannot be recommended because of identification problems (see SIMILAR SPECIES).

• **OCCURRENCE**
On the ground under conifers, especially fir and spruce. Widespread in northern temperate and warm-temperate zones.

• **SIMILAR SPECIES**
Ramaria formosa is a more colorful orange-pink without contrasting tips and is poisonous. There are 20 other similar species.

△ *RAMARIA SANGUINEA*
Rarer than *R. botrytis*, this species has thick yellow branches, the lower surfaces of which develop red spots with age or if bruised.

FRUITING Appears singly or in fairy rings or lines.

Dimensions FRUITBODY ↕ ↔ 7–15cm	Spores Ocher	Edibility

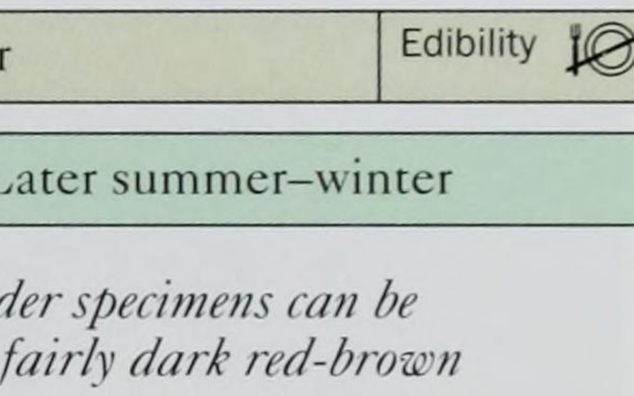
Family RAMARIACEAE	Species *Ramaria stricta*	Season Later summer–winter

BITTER CORAL

This many-branched fungus is typically erect and taller than it is wide, but size and shape vary greatly. Its branches are pale orange-yellow, aging to ocher-brown, with pale yellow tips. The fairly firm, bitter-tasting flesh stains wine-red and has a spicy smell. Young fruitbodies can be citrus-yellow all over.

• **OCCURRENCE** Usually on half-buried deciduous wood, often beech, but also on sawdust. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES**
Ramaria gracilis is paler with a distinct anise smell. It occurs mostly with conifer litter.



FRUITING Singly or in lines on rotten branches.

Dimensions FRUITBODY ↕ 4–12cm ↔ 3–8cm	Spores Ocher	Edibility

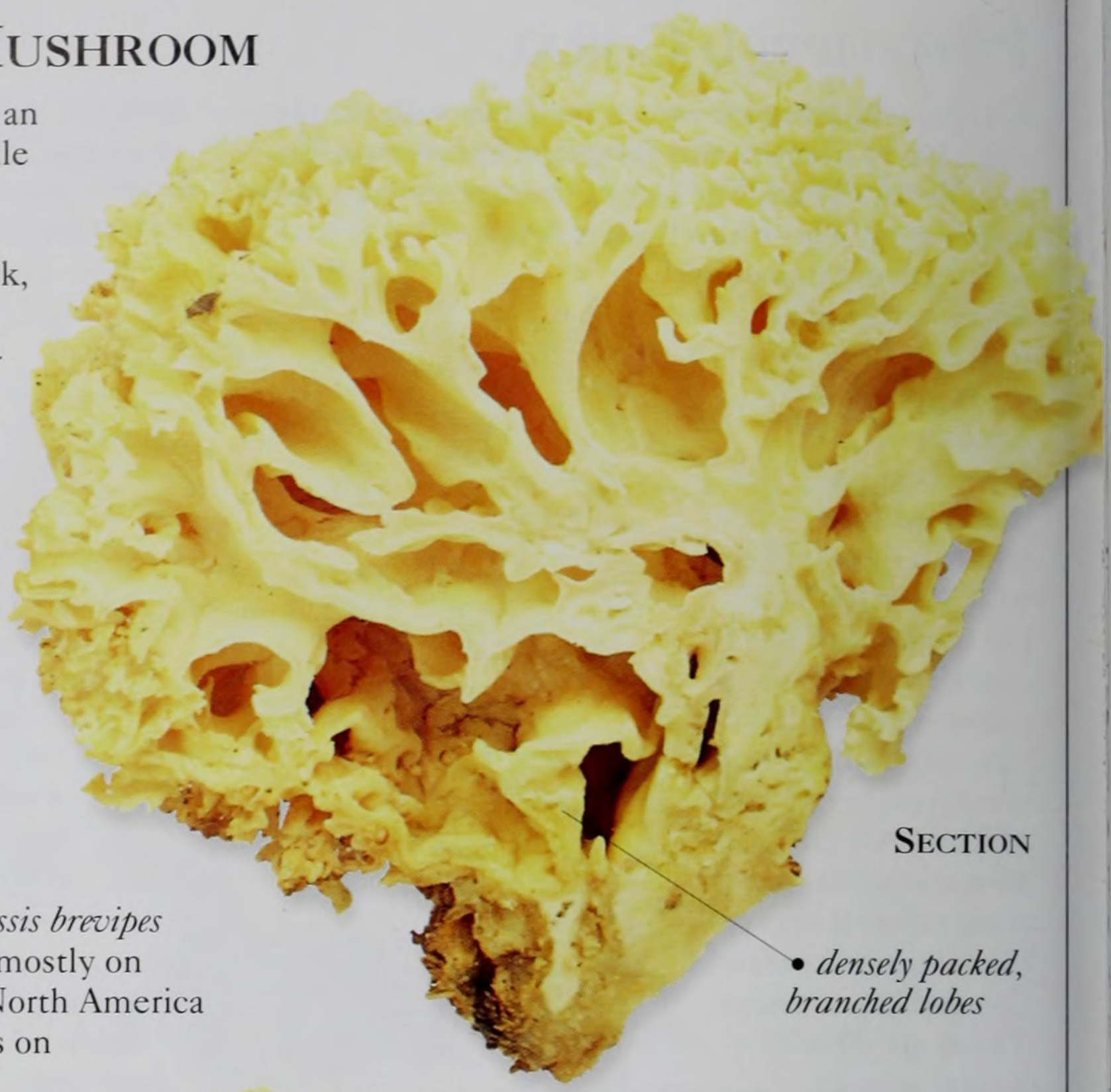
Family SPARASSIDACEAE	Species *Sparassis crispa*	Season Late summer–autumn

CAULIFLOWER MUSHROOM

A multitude of lobes forming an impressive fleshy, cream to pale yellow-brown fruitbody are characteristic of this species, which is borne on a short, thick, rootlike stem. The lobes are branched, flattened or ribbon-like, and fairly firm; like all members of this small family, the spore-producing layer is on one side only. Although difficult to clean, its pleasant taste and large size make it a very popular edible.

• **OCCURRENCE** Mostly on pine, in stands and native woods; causes brown rot. Widespread in northern temperate zones; common in western North America.

• **SIMILAR SPECIES** *Sparassis brevipes* is paler and tougher. It grows mostly on oak, beech, or fir. In eastern North America *S. herbstii* (*S. spathulata*) occurs on deciduous trees.



SECTION

densely packed, branched lobes

strongly folded, cauliflower-shaped fruitbody

spore-producing layer on one side of lobes only

fruitbodies may weigh up to 30lb; 2–20lb is typical

FRUITING Mostly singly on dead or dying conifer stumps.

Dimensions FRUITBODY ↕ ↔ 10–40cm	Spores White to pale yellow	Edibility

ROUNDED FUNGI

The fungi in this section are varied, but all produce rounded fruitbodies. With the exception of the Aborted Entoloma (below), those that occur above ground are puffballs, earthballs, and some flask-fungi (see p.244). Rounded fungi below ground are the truffles (pp.258–59), some of which are famous for their flavor.

• *rounded fruitbody*

ABOVE GROUND

THE FUNGI in this subsection are characterized by their stemless, rounded fruitbodies. (For rounded fruitbodies with stems see pp.260–63.) Some of the species are Basidiomycetes (see pp.10–11). They produce their spores within the fruitbody. The spores are released when its skin breaks down with age or when a pore develops on its top at maturity. Other species that are featured here are flask-fungi (see p.244). These have tiny, flask-shaped fruitbodies embedded in compound structures known as stromata.

Family ENTOLOMATACEAE	Species *Entoloma abortivum*	Season Autumn

ABORTED ENTOLOMA

A choice edible, the Aborted Entoloma normally produces rounded, lumpy white fruitbodies. These are thought to be the result of parasitizing the Honey Mushroom, *Armillaria mellea* (p.80). Cap and stem fruitbodies are occasionally produced, with caps to 10cm across and stems to 10cm high and 1.5cm wide. They are gray with decurrent pink gills. The white flesh smells of cucumber or fresh bread; in aborted forms it is pink-veined.

• **OCCURRENCE** On deciduous trees in open woodland. Widespread and common in eastern North America.

• **SIMILAR SPECIES** No other fungus produces aborted forms like this, but the cap and stem fruitbody are similar to other *Entoloma* species. However, they typically occur on the ground and lack decurrent gills. Many are poisonous, so it is unwise to eat isolated unaborted forms of *Entoloma abortivum*.

cap is convex and gray to gray-brown

decurrent, off-white gills age to grayish white or pink

stem is not always central under cap

firm white aborted form is irregularly rounded

pale yellow patches may be visible

FRUITING Clusters of rounded forms with scattered cap and stem fruitbodies.

Dimensions ABORTED FORM ↕ 2.5–5cm ↔ 2.5–10cm	Spores Pink to salmon-pink	Edibility

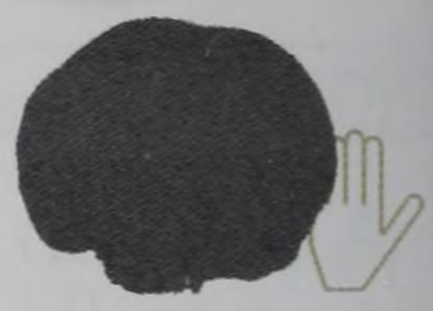
Family LYCOPERDACEAE	Species *Calvatia gigantea*	Season Summer–autumn

GIANT PUFFBALL

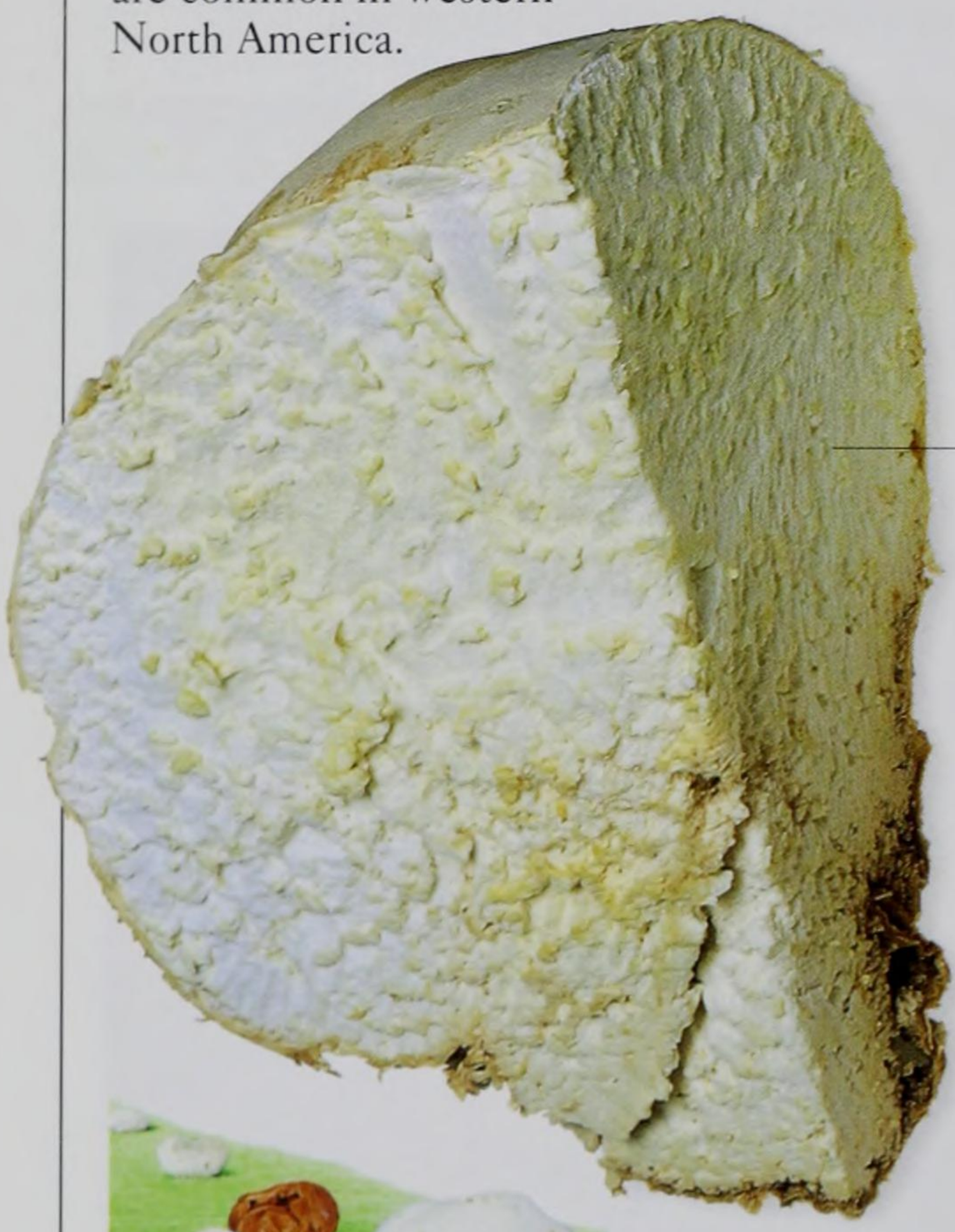
This is one of the best-known edible fungi. Its huge, ball-shaped, white or cream fruitbodies regularly weigh above 9lb, and record finds are over 44lb. Most of the interior of the fruitbody consists of a huge number of spores; the lower, sterile part is much reduced. Its flesh is firm in texture and white when young.

• OCCURRENCE Saprotrophic; in disturbed sites with nutrient-rich soil, in fields, woodland edges, and parks. Widespread and locally common in northern temperate zones. Other giant puffball species are common in western North America.

huge, ball-shaped, white or cream fruitbody



SECTION



flesh is edible when white and firm

leathery, smooth outer skin rots away to allow spores to escape

spore-producing tissue becomes yellow then olive-brown with age

FRUITING Mostly appears in small fairy rings.

Dimensions FRUITBODY ↕ ↔ 20–50cm	Spores Olive-brown	Edibility

Family LYCOPERDACEAE	Species *Bovista plumbea*	Season Summer–autumn

COMMON TUMBLING PUFFBALL

The white outer skin of this rounded fungus peels off at maturity, like the shell of a boiled egg, revealing a gray inner layer. Inside the ball is pale yellow tissue, which produces a huge number of spores. At maturity, the fruitbody of this and other *Bovista* species often becomes detached and rolls about, increasing spore dispersal, which occurs from a pore in the top. This *Bovista* is not of great culinary interest.

• **OCCURRENCE** Saprotrophic; it is confined to grassland, especially dry grassland, and it tolerates fairly high fertilizer levels in the soil. Cosmopolitan except for humid lowland tropics.

• **SIMILAR SPECIES** The inner covering layer of *B. pila* is dark brown to bronze.

golfball-like in size and shape

distinct pore in top allows spores to escape

outer skin peels to reveal papery gray inner layer

SECTION

pale yellow spore-producing tissue

two-layered skin (peridium)

base is also fertile

FRUITING Mostly appears in groups or a few together.

Dimensions FRUITBODY ↕ ↔ 1–3cm	Spores Olive- to sepia-brown	Edibility

Family LYCOPERDACEAE	Species *Vascellum pratense*	Season Summer–autumn

MEADOW PUFFBALL

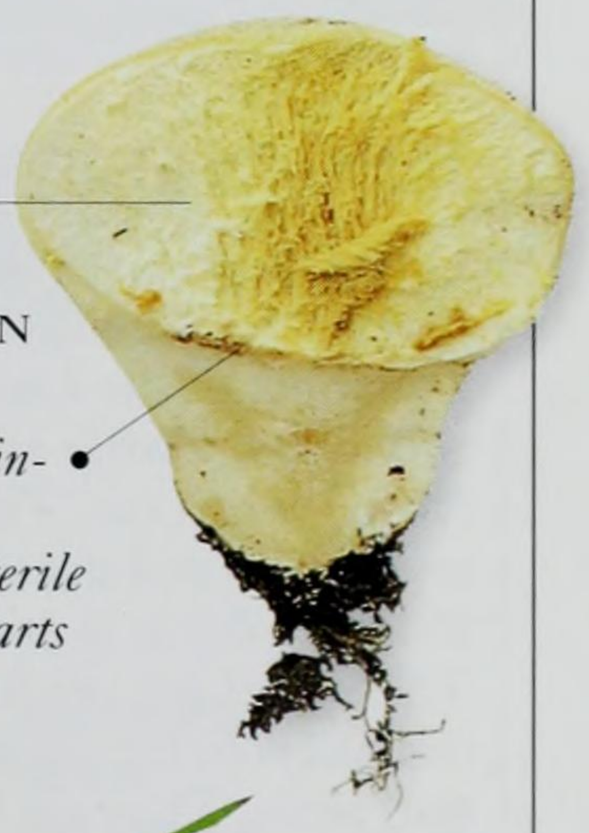
The key identification characteristic of this spiny, white to pale brown species can be difficult to see: it is a kind of membrane separating the fertile, globe-shaped top part from the short, sterile stem part. The fruitbody usually has a rather flattened top with a large opening, through which the spores escape; the sterile part often persists until the next spring. Firm, fresh specimens can be eaten but taste bland.

• **OCCURRENCE** Saprotrophic; it is found growing on soil and organic matter in grassy areas such as lawns, parks, golf courses, and pastures. Virtually cosmopolitan, but absent in lowland tropics.

fertile tissue is minutely chambered

SECTION

very thin, skin-like tissue separating sterile and fertile parts



flattened top of fruitbody

white fruitbody becomes pale yellow then pale brown

mealy surface covered in fine spines

short stem

FRUITING Mostly appears in small groups.

Dimensions FRUITBODY ↕ 1.5–3.5cm ↔ 2–4.5cm	Spores Gray-olive to olive-brown	Edibility

Family SCLERODERMATACEAE	Species *Scleroderma citrinum*	Season Summer–autumn

COMMON EARTHBALL

This hard, potato-like fungus, which is a familiar sight in damp woodland, has pale yellow skin covered with scales. It has a tough, pale yellow outer skin, which is 2–5mm thick, and its distinctive spore-filled, black interior is somewhat marbled. Inedible and poisonous, it can develop a strong metallic smell.

• **OCCURRENCE** Mycorrhizal with deciduous trees, mostly in damp woodland; it can be found with *Boletus parasiticus* (p.194). Widespread and common in areas of northern temperate zones.

• **SIMILAR SPECIES** Edible *Lycoperdon* species (pp.260–61) and *Tuber* species (pp.258–59) differ in overall shape, color, smell, and spore shape.

firm black spore-bearing tissue is powdery when mature

tough skin is 2–5mm thick

SECTION

surface skin rots away, exposing spores for dispersal

fruitbody resembles a potato

brown scales on thick, pale yellow skin

FRUITING Often appears in clusters among moss.

Dimensions FRUITBODY ⟷ 4–10cm	Spores Purplish black	Edibility

Family RUSSULACEAE	Species *Zelleromyces cinnabarinus*	Season Summer–autumn

RED GASTROID LACTARIUS

Looking like a misshapen puffball, this species has the microscopic characteristics of a member of the *Lactarius* genus (pp.43–55) and, like *Lactarius* species, produces white "milk" when cut. The milk tastes mild and does not change color as it dries. The spores are produced in chambers in the cinnamon-buff flesh. They are released as the fungus decays or are spread by animals, which eat the rounded fruitbodies.

• **OCCURRENCE** Mycorrhizal with pine trees in areas of open woodland. Widespread and common in eastern North America, but easily overlooked in its habitat.

surface is smooth and dull

irregularly rounded to ovoid fruitbody

thin skin is cinnabar-red to cinnamon-brown

chambered, spore-bearing tissue is cinnamon-buff

FRUITING Scattered or several fruitbodies under pines, either on the soil surface or just beneath.

Dimensions FRUITBODY ⟷ 3–5cm	Spores Pale cinnamon-buff	Edibility

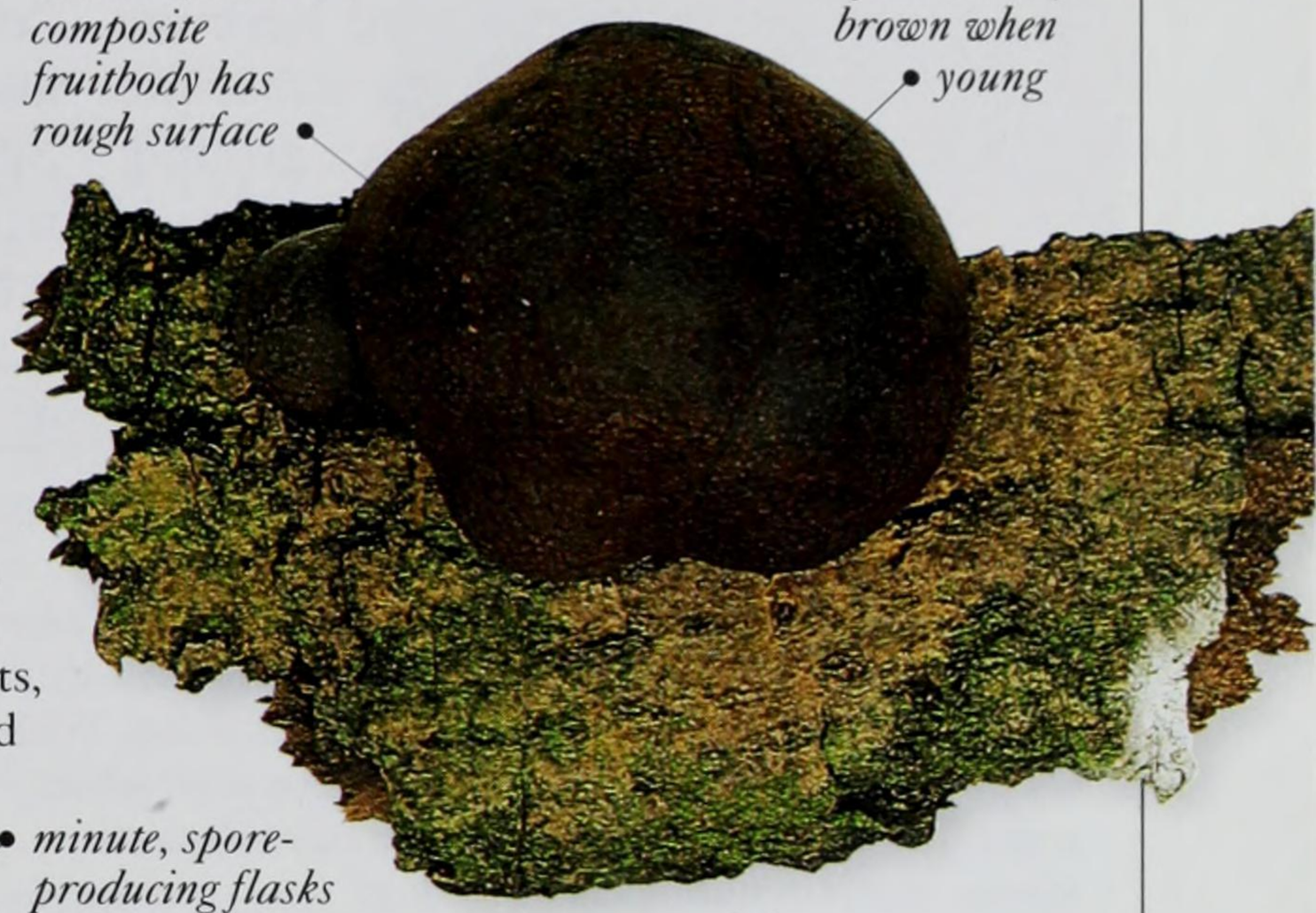
Family XYLARIACEAE	Species *Daldinia concentrica*	Season All year

CRAMP BALLS ASCO

The rounded, rusty brown composite fruitbodies, or stromata, of this flask-fungus are large and have flesh that is zoned in dark and light bands. When the spores are mature, they are forcibly ejected from asci inside the spore-producing chambers, or flasks, just beneath the surface. The long-lasting stromata eventually turn black and become crumbly in texture.

• **OCCURRENCE** Mostly on still-standing, dead, or dying trunks of ash trees; also birch and other deciduous trees in parks and forests, especially following fire damage. Widespread in northern temperate zones; most of North America and in the United Kingdom.

• **SIMILAR SPECIES** *Hypoxylon* species (below) have unzoned flesh.



SECTION

FRUITING Appears singly or in large or small groups.

Dimensions COMPOSITE FRUITBODY ⟷ 2–10cm	Spores Black	Edibility

Family XYLARIACEAE	Species *Hypoxylon fragiforme*	Season All year

BEECH CUSHION ASCO

The fruitbodies (stromata) of this flask-fungus are stemless and range from pink through brick-red, becoming black when overmature. They have a hard, rough, warty surface, just beneath which are the spore-producing, flask-shaped chambers. The flesh is black and hard.

• **OCCURRENCE** On bark of freshly fallen beech trees in forests. Widespread and common wherever beech occurs in northern temperate zones.

• **SIMILAR SPECIES** *Hypoxylon howeianum* occurs on other deciduous trees. *H. rubiginosum* is flat, spreading, and reddish brown. *H. fuscum* is purplish brown.

FRUITING Appears in spreading troops on bark.

Dimensions COMPOSITE FRUITBODY ⟷ 0.5–3cm	Spores Black	Edibility

BELOW GROUND

THE MUSHROOMS featured here are among many that have tuberlike fruitbodies, produced below ground. The spore-bearing asci are enclosed in the fruitbodies. The *Tuber* species, "truffles," have fairly solid interiors and are related to *Peziza* (pp.266–67). Species of *Elaphomyces*, which are not true truffles, have a powdery interior when they reach maturity.

Family TUBERACEAE	Species *Tuber aestivum*	Season Summer

EURO SUMMER TRUFFLE

The least expensive of the true edible truffles, *Tuber aestivum* has a more or less round fruitbody with a rough surface covered in pyramidal black warts. Within the fungus, the solid flesh is gray-brown with white veins. Like its relatives, this truffle has a distinct aroma, reminiscent of seaweed, and a faint nutty taste. Flies are attracted to *Tuber* fruitbodies, helping collectors to pinpoint truffle sites.

• OCCURRENCE Found among roots of beech, birch, and oak trees. Widespread in southern and central Europe and southern Scandinavia.

FRUITING Grows singly or in groups among tree roots.

Dimensions FRUITBODY ⟷ 2–5cm	Spores Yellow-brown	Edibility

Family TUBERACEAE	Species *Tuber melanosporum*	Season Late autumn–early spring

PERIGORD TRUFFLE

The rough, coal-black surface of the irregularly shaped Perigord Truffle consists of many tiny, polygonal warts. The solid flesh is made brown by the spores and turns black with age; it has white veins and a distinctive smell and taste. Perigord Truffles are collected from the wild by skilled pickers using specially trained dogs or pigs, but inoculated seedlings of host trees are now commercially available.

• OCCURRENCE Under species of Mediterranean oaks and other host trees on alkaline, red Mediterranean soils. It is a warmth-loving species, confined to southern Europe where the annual yield is about 330 tons. Other edible *Tuber* species are found in North America.

• SIMILAR SPECIES *Tuber brumale* is found farther north. *T. macrosporum* has an almost smooth surface.

FRUITING Grows singly, buried among tree roots.

Dimensions FRUITBODY ⟷ 2–7cm	Spores Dark brown	Edibility

Family TUBERACEAE	Species *Tuber magnatum*	Season Autumn–winter

EURO WHITE TRUFFLE

The fruitbody of this choice edible is irregularly round in shape, pale ocher to cream, and has a smooth surface. Its cream-colored flesh has a spicy odor and flavor. The spores can be seen as darker cream-brown areas in the flesh. Attempts are being made to cultivate the species on a large scale by inoculating suitable host roots; if this is successful the prevalent high prices may drop.

• **OCCURRENCE** Buried in alkaline soil among the roots of oak, but also found among poplar and willow. Found in the Piemonte region of northwestern Italy and in France.

• **SIMILAR SPECIES** *Tuber gibbosum*, found in North America, also has pale flesh and is edible.

△ *TUBER CANALICULATUM*
This is a rounded to egg-shaped, warty, reddish brown truffle. Its flesh is tan with white streaks. At maturity, the fruitbodies push up above ground or are uprooted by animals. It is a choice edible of North America.

• *fruitbody looks somewhat like a potato*

cream flesh is marbled with white veins •

SECTION

FRUITING Grows singly, or in groups among tree roots.

Dimensions FRUITBODY ⟷ 2–8cm	Spores Brown	Edibility

Family ELAPHOMYCETACEAE	Species *Elaphomyces granulatus*	Season All year

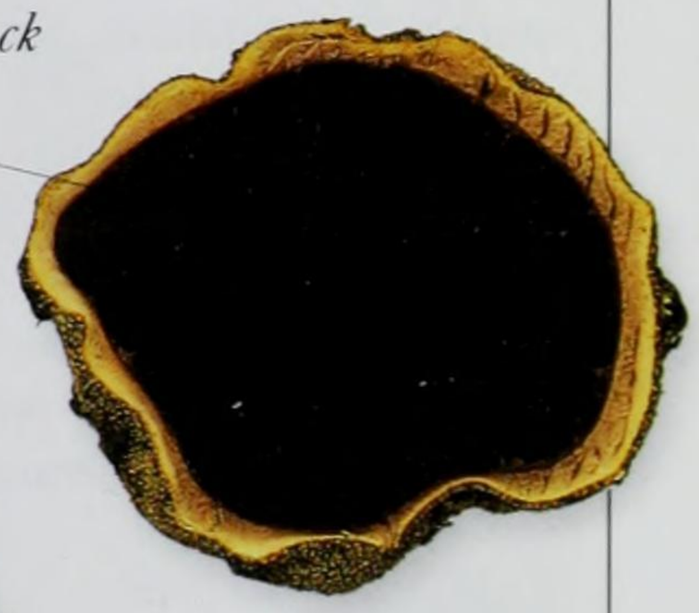
COMMON FALSE TRUFFLE

This truffle has a thick-fleshed, scaly, warty, uniformly yellow-brown surface. Within the fruitbody, the spores are produced in a powdery mass that disperses when the skin breaks down at maturity.

• **OCCURRENCE** Mycorrhizal with a wide range of conifers and deciduous trees in woods and parks. *Cordyceps ophioglossoides* (p.245) parasitizes it and can be used to locate it. Widespread and common in Europe; also found in North America and Japan.

• **SIMILAR SPECIES**
E. muricatus has a marbled outer layer, just beneath the warty, yellow-brown rind.

powdery black interior at maturity •



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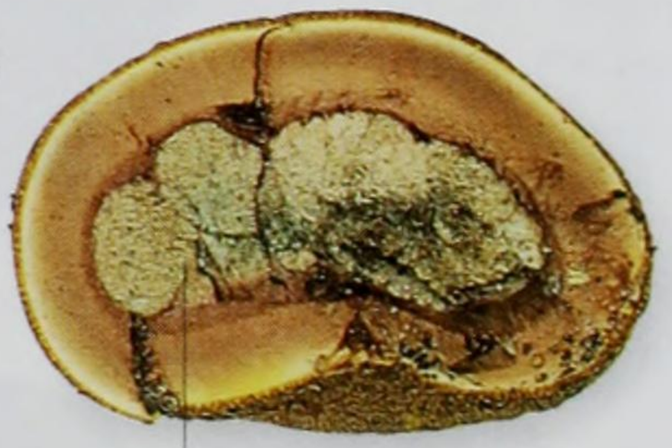


• *fertile tissue is pale brown when immature*

scaly, warty surface is golden brown •

FRUITING In large or small groups underground.

Dimensions FRUITBODY ⟷ 1.5–4.5cm	Spores Blackish brown	Edibility

PEAR- TO PESTLE-SHAPED FUNGI

This section features puffballs and earthballs that typically have a short, stemlike base supporting the rounded, fertile top (see also pp.253–57). At maturity, the spores are released either through a pore in the top or as the outer skin breaks down. Drops of rain or other disturbance of the fruitbody helps to disperse the spores.

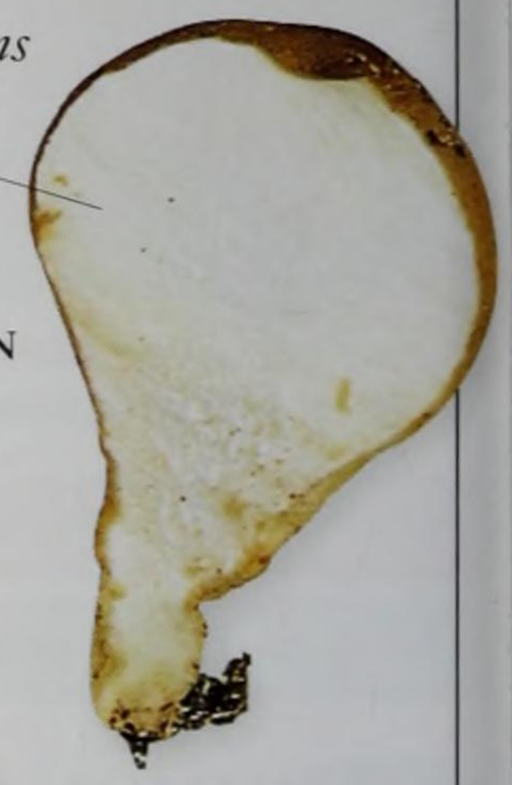
Family LYCOPERDACEAE	Species *Lycoperdon pyriforme*	Season Autumn–winter

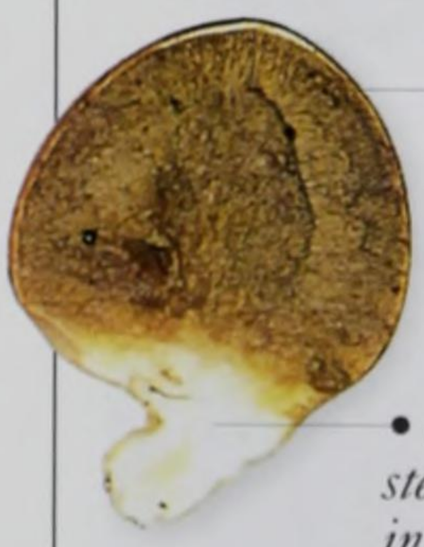
STUMP PUFFBALL

This is one of the more easily identified *Lycoperdon* species: identification marks include its elongated pear shape, its smooth surface at maturity, white cords at the base, and its occurrence on woody substrates – others in the genus grow on the ground. Young fruitbodies have a warty to spiny skin. They are edible, but not choice, when their flesh is firm and white.

• **OCCURRENCE** Saprotrophic; on rotten deciduous wood and, more rarely, conifers in woods, open parks, and gardens. Almost cosmopolitan; absent in extreme climatic zones.

• **SIMILAR SPECIES** Found in open, wooded areas, *L. lividum* is also smooth, but is grayer and has warty spores (those of *L. pyriforme* are almost smooth).





FRUITING Typically in large, clustered groups.

Dimensions FRUITBODY ↕ 1.5–5cm ↔ 1–2.5cm	Spores Olive-brown	Edibility

Family LYCOPERDACEAE	Species *Lycoperdon echinatum*	Season Autumn

HEDGEHOG PUFFBALL

Long brown spines on the surface of the globe-shaped, tapering fruitbody give the Hedgehog Puffball its name. The spines fall off at maturity, leaving a distinctive net pattern on the dark brown surface. The spore-bearing tissue is white and firm when young, becoming brown at maturity when the lilac-tinted, chocolate-brown spores escape through a pore on the top; the sterile basal flesh also darkens with age.

• **OCCURRENCE**
Saprotrophic; on alkaline soil in beech woods. Sometimes found beside the rarer, pink-tinged *Lycoperdon mammiforme*. In warmer parts of Europe and nearby parts of Asia.

• **SIMILAR SPECIES**
L. americanum is similar in appearance and occurs in North America.

FRUITING A few together, often on ditch banks.

Dimensions FRUITBODY ↕ 3–7cm ↔ 1–3cm	Spores Chocolate-brown	Edibility

Family LYCOPERDACEAE	Species *Lycoperdon perlatum*	Season Autumn

COMMON PUFFBALL

Rounded, typically with a distinct stem, this white to yellowish brown species is covered with short spines, each surrounded by smaller, grainlike scales. A projection on the top marks where the pore, through which the spores escape, will form. At maturity, the spines fall off, leaving a regular pattern on the skin. The firm white flesh is edible when young, becoming darker and unpalatable with age.

• **OCCURRENCE** Saprotrophic; on soil, mainly in woods but also in grassland. Widespread; common in northern temperate zones.

• **SIMILAR SPECIES**
Lycoperdon nigrescens has longer, darker spines in groups, like those of the much longer-spined *L. echinatum* (above). The surface of both has a similar pattern when the spines fall off.

FRUITING In dense groups or occasionally singly.

Dimensions FRUITBODY ↕ 4–7cm ↔ 2–4cm	Spores Pale yellow to olive-brown	Edibility

Family LYCOPERDACEAE	Species *Calvatia excipuliformis*	Season Autumn

PESTLE-SHAPED PUFFBALL

This buff-brown fungus typically has a tall stem with a rounded upper fertile part; short-stemmed specimens also occur. When mature, the outer skin breaks open and the brown spores within are dispersed by wind and rain. When young and firm, the fruitbodies are edible but fairly tasteless. The stem part becomes very tough as it matures and may even persist into the following season.

• **OCCURRENCE** Saprotrophic; on soil or turf in woods or open areas. Widespread and common in most parts of northern temperate zones, extending to subarctic and subtropical zones.

• **SIMILAR SPECIES** *C. elata* is widespread and common in North America. *Lycoperdon molle* resembles a short-stemmed specimen.

FRUITING Mostly in small groups of fruitbodies.

Dimensions FRUITBODY ↕ 5–20cm ↔ 5–10cm	Spores Olive-brown to brown	Edibility

Family LYCOPERDACEAE	Species *Calvatia utriformis*	Season Summer–autumn

MOSAIC PUFFBALL

This large species has pear-shaped fruitbodies with coarse scales, which are lost at maturity. The top skin rots away to reveal the powdery brown spore mass. The lower, sterile part is white, aging to brown. Edible when young but not tasty.

• **OCCURRENCE** Saprotrophic; found growing in open, often coastal, areas. Widespread in northern temperate zones.

• **SIMILAR SPECIES** *C. cyathiformis* has a lilac-tinted spore mass; common in eastern North America.

FRUITING Mostly in small groups among grasses, lichens, and low herbs.

Dimensions FRUITBODY ↕ 5–10cm ↔ 5–15cm	Spores Chocolate-brown	Edibility

Family SCLERODERMATACEAE	Species *Scleroderma verrucosum*	Season Autumn

SCALY EARTHBALL

This fairly large species is pale yellow to brown and covered with irregular brown scales. It has a stemlike projection and thin skin, to 1mm thick. The spore-bearing tissue is white and smells metallic, soon turning dark purple-brown as it matures. The spores are dispersed by wind as the outer skin of the fruitbody distintegrates.

• **OCCURRENCE** Mycorrhizal with deciduous trees such as oak and beech, growing in wooded areas and open parks. Widespread and common in both northern and southern temperate zones.

FRUITING Mostly a few together or singly, often on bare soil.

Dimensions FRUITBODY ↕ 5–10cm ↔ 2–5cm	Spores Purple-black	Edibility

Family CALOSTOMATACEAE	Species *Calostoma cinnabarina*	Season Late summer–autumn

PUFFBALL-IN-ASPIC

This species has a gelatinous outer layer and a red inner layer, breaking up to enclose the stem in a thick jelly, dotted with red pieces. The exposed, ovoid top is coated in a red powder that wears away to reveal a pale yellow ball with a cross-shaped opening for spore release.

• **OCCURRENCE** Found growing on the ground in open woods. Widespread and common in eastern North America.

• **SIMILAR SPECIES** *Calostoma lutescens* is yellow and extremely small. *C. ravenelii* is straw-yellow and not gelatinous.

FRUITING Appears in small groups on the ground in open wooded areas.

Dimensions FRUITBODY ↕ 2–5cm ↔ 1–2cm	Spores White to cream	Edibility

CUP- TO DISK-SHAPED

Although they all produce cup- or disk-shaped fruitbodies, the mushrooms in this section belong to two separate groups. The first group has more or less circular fruitbodies that are shallowly cupped or flat (pp.264–73); the second group has deeply cupped, nestlike fruitbodies containing tiny, lentil-shaped structures (p.274).

WITHOUT "EGGS"

THIS SUBSECTION features fungi that produce cup- or disk-shaped fruitbodies with a smooth, spore-bearing surface (hymenium) on the inner side of the cup or on the top of the disk. When mature, the spores are discharged violently (see p.16–17).

The morels (pp.209–10) evolved from simple cup-fungi, but have distinct stems and are more elaborate in shape.

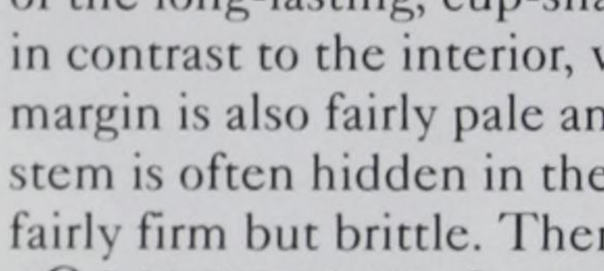
Family SARCOSCYPHACEAE	Species *Sarcoscypha austriaca*	Season Late autumn–early summer

CURLY-HAIRED ELF CUP

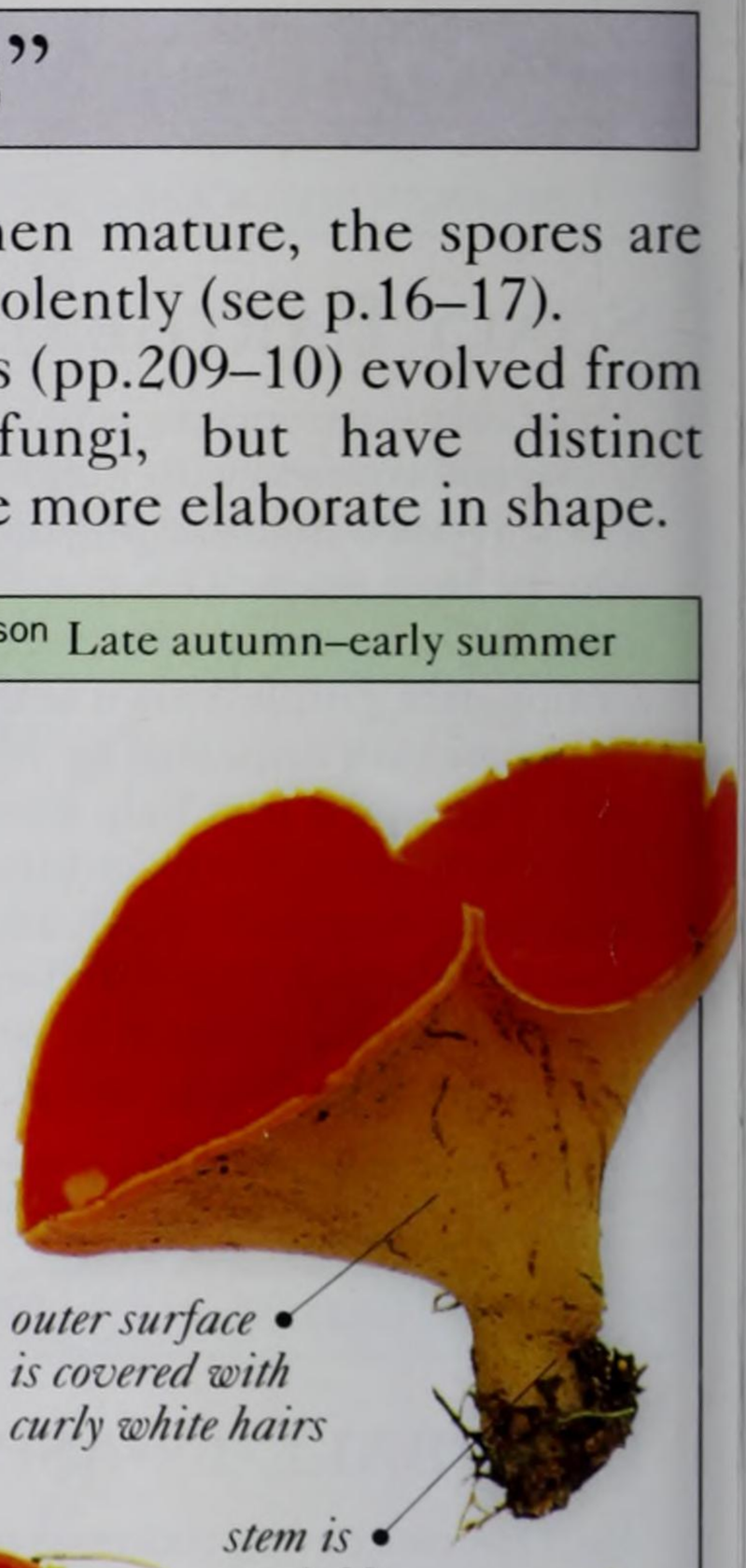
This fungus has tiny, corkscrewlike white hairs on the outside of the long-lasting, cup-shaped fruitbody, making it appear pale in contrast to the interior, which is bright scarlet. The cup margin is also fairly pale and may be finely toothed. The pale stem is often hidden in the substrate, and the pale red flesh is fairly firm but brittle. There is also a pure white form.

• **OCCURRENCE** Grows on wood substrates in deciduous areas. Widespread throughout Europe and probably in other parts of northern temperate zones.

• **SIMILAR SPECIES** *Sarcoscypha coccinea* has straight hairs on the outside of the cup. Other species of *Sarcoscypha* have more localized distributions and differ in spore characteristics and germination.



FRUITING Appears in troops on moss-covered rotting wood.



Dimensions CUP ⇔ 1–8cm ↕ 0.5–3cm | STEM ↕ 0–3cm ↔ 3–5mm	Spores White	Edibility

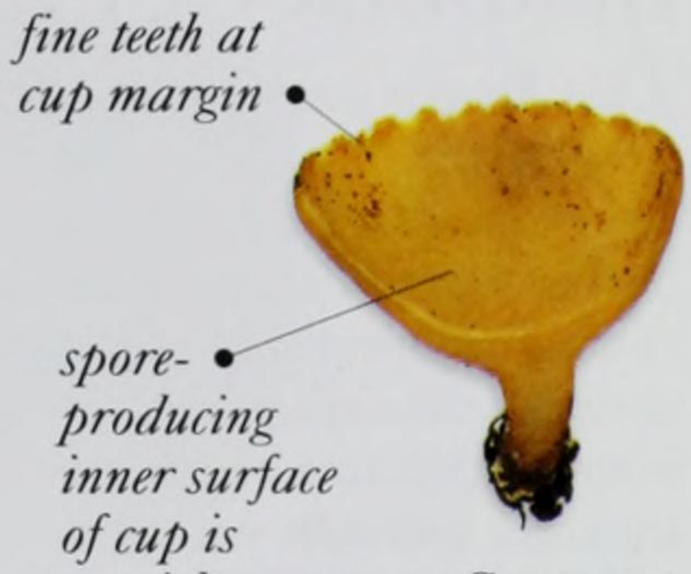
Family OTIDEACEAE	Species *Tarzetta cupularis*	Season Summer–autumn

DENTATE ELF CUP

The wine goblet-shaped fruitbody of the Dentate Elf Cup has small, triangular teeth at the cup margin and a short stem. Unlike other cup fungi that expand with age, its shape remains the same as the fruitbody matures. The outer surface of the fruitbody has a granular texture and is pale buff; inside the cup, the spore-producing layer (hymenium) is grayish cream.

• **OCCURRENCE** Found growing on nutrient-rich, calcareous or clay soil in parks and conifer forests. Widespread and fairly common in northern temperate zones.

• **SIMILAR SPECIES** Other members of this small genus occur in the same habitat. Size is the major distinguishing feature: *Tarzetta caninus* has the largest cup, reaching 5cm in diameter. Otherwise it is very difficult to differentiate between the species, although stem development and microscopic features can help.



SECTION

FRUITING Appears in small groups, mostly on bare soil.

Dimensions CUP ↔ 0.5–1.5cm ↕ 0.5–2.5cm | STEM ↕ 0.3–1cm ↔ 2–4mm	Spores White	Edibility

Family MORCHELLACEAE	Species *Disciotis venosa*	Season Spring–early summer

CUPLIKE MOREL

Initially cup-shaped, the rich, dark brown fruitbody of the Cuplike Morel flattens and may become convex as it ages. Its surface is distinctly ribbed and furrowed, particularly in larger specimens; the underside is off-white with a scurfy covering. The reduced stem is thick and off-white; the pale flesh is brittle and thick. Although eaten in parts of Europe, this species is hard to identify in North America; little is known about the edibility of its look-alikes.

• **OCCURRENCE** In parks and woods, often alongside *Morchella semilibera* (p.210). In deciduous woods in eastern North America; under conifers in the West. Widespread in most regions except arctic-alpine and tropical zones; worldwide distribution unclear.

FRUITING Appears singly or in groups on the ground, always growing on nutrient-rich soil.

Dimensions CUP ↔ 4–10cm | STEM ↕ ↔ 2mm	Spores Cream	Edibility

Family PEZIZACEAE	Species *Peziza vesiculosa*	Season All year

BLADDER CUP

This fungus has a tightly rolled, curved margin and a distinctive bladder shape with blisterlike pustules developing in cups. The outer surface is pale buff and granular; the inner spore-bearing surface (hymenium) is pale yellow-brown. The opening through which the spores are released is small and, unlike most other *Peziza* species, it barely expands with age.

• OCCURRENCE In parks, gardens, and around farm buildings on nutrient-rich substrate such as composted manure, mulch in flower beds, and rotting straw. It is often found near other cup-fungi and ink caps (*Coprinus* species, pp.174–76). Widespread and common in northern temperate zones.

FRUITING Appears in dense clusters or singly.

Dimensions CUP ⇹ 3–10cm ↕ 1–4cm	Spores White	Edibility

Family PEZIZACEAE	Species *Peziza badia*	Season Summer–autumn

OLIVE-BROWN CUP

A liver-brown fruitbody that becomes darker olive-brown inside as it matures is characteristic of this species, although it is positively distinguishable from other brown *Peziza* species only with the use of a microscope. This reveals, among other things, an incomplete net ornament on the spores. The fruitbody is stemless with a granular, reddish brown outer surface and thin, reddish brown flesh.

• OCCURRENCE On sandy soil by paths in conifer stands, or banks of ditches in boggy areas close to birch trees. Widespread and common in northern temperate zones.

• SIMILAR SPECIES Paler brown species, such as *P. micropus*, *P. repanda*, and *P. varia*, can be found on rotten trunks.

FRUITING Grows in troops and small clusters.

Dimensions CUP ⇹ 1.5–7cm ↕ 0.5–3cm	Spores White	Edibility

Family PEZIZACEAE	Species *Peziza succosa*	Season Summer–autumn

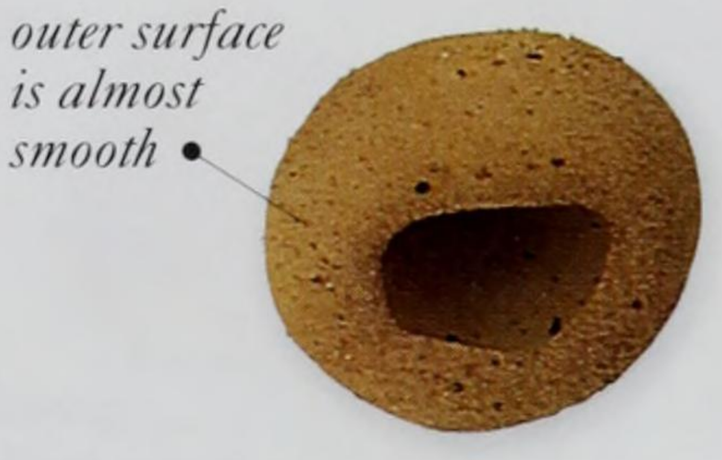
YELLOW-MILK CUP

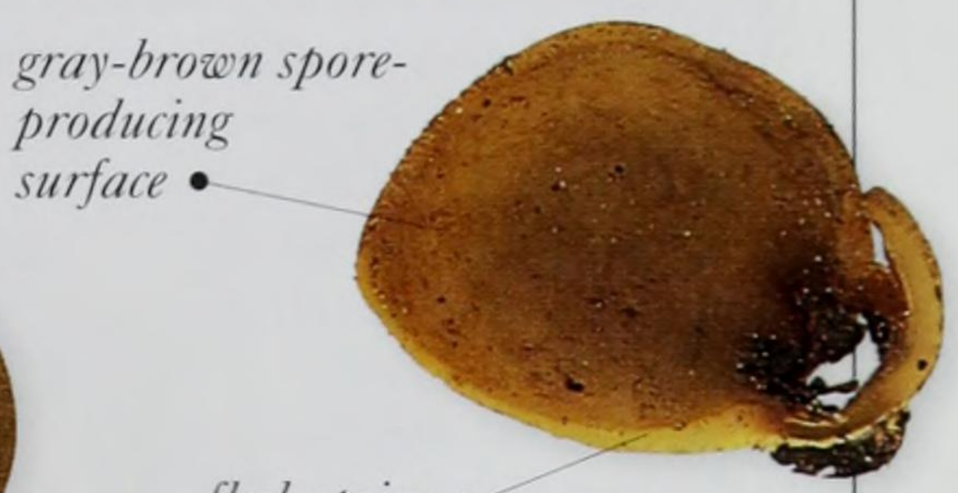
Cup-shaped and yellow- to gray-brown, the Yellow-milk Cup is distinguished from most other *Peziza* species by its reaction when cut open: the thin, yellow-brown flesh exudes a milky yellow juice that gradually turns bright yellow. With age, the cup expands and becomes irregular in shape.

• **OCCURRENCE** Along roadsides in deciduous areas; often found with *Helvella* and *Inocybe* species. Widespread and common in Europe; also occurs in eastern and central North America.

• **SIMILAR SPECIES** Other *Peziza* species that have yellow juice include *P. michelii*, with its lilac tinges, and *P. succosella*, which has a greenish yellow flesh reaction and smaller spores.

FRUITING Singly or in troops on clay-rich soil.





Dimensions CUP ⇿ 0.5–5cm ↕ 0.5–2cm	Spores White	Edibility

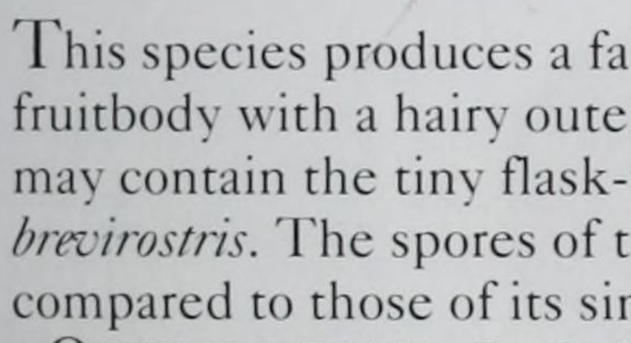
Family OTIDEACEAE	Species *Geopora arenicola*	Season Summer–autumn

SANDY EARTH CUP

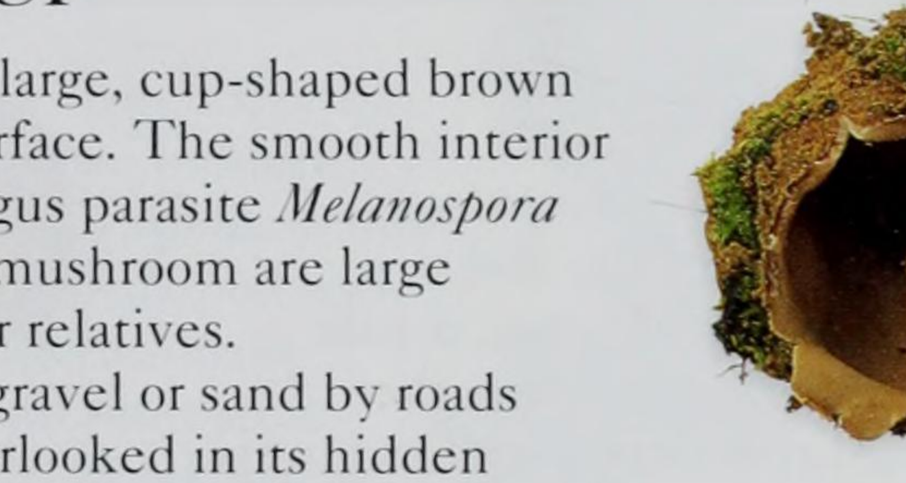
This species produces a fairly large, cup-shaped brown fruitbody with a hairy outer surface. The smooth interior may contain the tiny flask-fungus parasite *Melanospora brevirostris*. The spores of this mushroom are large compared to those of its similar relatives.

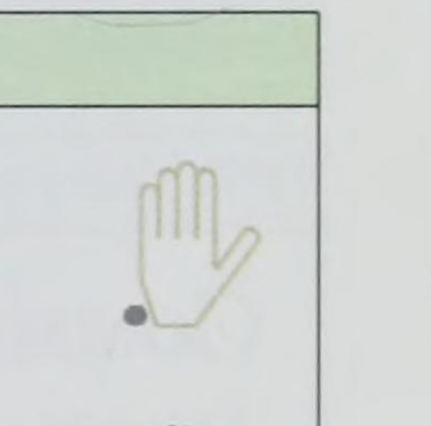
• **OCCURRENCE** Buried in gravel or sand by roads or in gravel pits, it is easily overlooked in its hidden habitat. Widespread and common in Europe. Also found in northeastern United States and in California.

• **SIMILAR SPECIES** All species of *Geopora* are sunk in the soil, some producing only a tiny opening, others splitting in a starlike pattern when very mature. *Humaria hemisphaerica* develops on the soil surface. There is also a range of other similar species, but it is very difficult to distinguish many species in this genus.



FRUITING In troops breaking through the soil surface.





Dimensions CUP ⇿ 0.5–2cm ↕ 1–2cm	Spores White	Edibility

Family OTIDEACEAE	Species *Aleuria aurantia*	Season Summer–autumn

ORANGE-PEEL CUP

With its vivid orange coloring and downy outer surface, the Orange-peel Cup is one of the most attractive cup-fungi. The cup margin is inrolled when young, becoming wavy. The cup flattens with age. The thin, brittle, white to pale flesh is edible but must be cooked because it is toxic when raw.

• **OCCURRENCE** Found on gravelly soil in disturbed sites, such as on dirt roads and on new lawns. Some *Scutellinia* species (see below) can also be found in similar sites. Widespread and common in European northern temperate zones.

• **SIMILAR SPECIES** Found on similar sites, *Melastiza chateri* is smaller, reddish orange, and has very short, pale brown hairs at the cup margin. Other *Aleuria* species have smaller cups and are rarer; a microscope is required to identify them correctly.

cup becomes wavy and flattened with age

outer surface covered with white down

vivid orange inner surface

margin inrolled when young

stemlike base is visible on some specimens

FRUITING Appears in large groups and clusters.

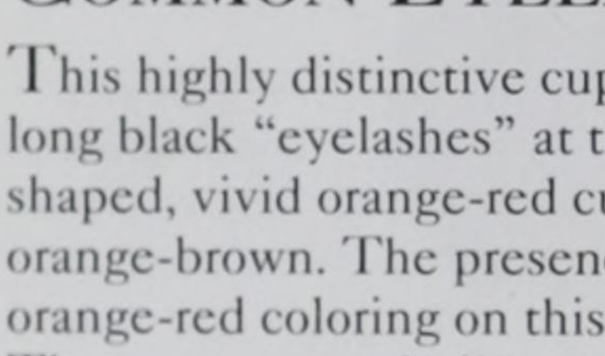
Dimensions CUP ↔ 2–10cm ↕ 0.2–3cm	Spores White	Edibility

Family OTIDEACEAE	Species *Scutellinia scutellata*	Season Late spring–winter

COMMON EYELASH CUP

This highly distinctive cup-fungus has conspicuous long black "eyelashes" at the margin of the disk-shaped, vivid orange-red cup; the outer surface is pale orange-brown. The presence of carotene causes the orange-red coloring on this and other orange-colored fungi. There are many similar species in this complex genus; under a microscope, spore shape and ornamentation offer the best clues for positive identification.

• **OCCURRENCE** On wet, mossy wood near ponds, occasionally on organic soil. Widespread and common in northern temperate zones.



FRUITING Typically appears in dense swarms on wood.

inner surface is bright orange-red

when fully mature, dark brown hairs point outward

dark brown hairs project inward when young

grows on wet and rotten wood

Dimensions CUP ↔ 0.5–1cm ↕ 2mm	Spores White	Edibility

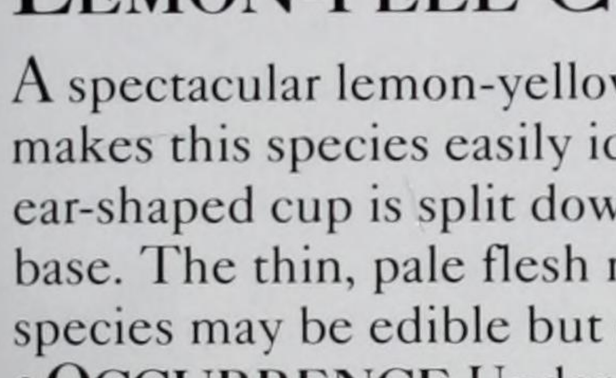
Family OTIDEACEAE	Species *Otidea onotica*	Season Autumn

LEMON-PEEL CUP

A spectacular lemon-yellow to yellow, rosy orange fruitbody makes this species easily identified in a difficult genus. The ear-shaped cup is split down one side and has a stemlike, off-white base. The thin, pale flesh may develop rusty spots with age. *Otidea* species may be edible but are rare so cannot be recommended.

• **OCCURRENCE** Under deciduous trees such as hazel and oak, and conifers, but not strictly associated with any host. Widespread but scattered in northern temperate zones.

• **SIMILAR SPECIES** *O. leporina* is found mostly in conifer forests; *O. smithii*, common in the Rockies, is dark brown; *Wynnea americana*, which grows from a sclerotial mass, is dark brown with a reddish inner surface.



FRUITING In small clusters among leaf litter on soil.

Dimensions CUP ⇔ 1–3cm ↕ 3–10cm	Spores White	Edibility

Family LEOTIACEAE	Species *Chlorociboria aeruginascens*	Season All year

GREEN STAIN CUP

This fungus makes a blue-green stain inside its woody substrate. The fruitbodies are produced seasonally under ideal conditions. A similar blue-green color, they are tough and cup-shaped with a smooth surface and smooth or occasionally wavy margins. The underside and short stem are paler blue-green. The stained wood, known as "green oak," is sometimes used in woodwork.

• **OCCURRENCE** In deciduous woods, often on the fallen branches of oak or hazel trees. Widespread and fairly common in northern temperate zones.

• **SIMILAR SPECIES** Some related species, especially *Chlorociboria aeruginosa*, may also produce a green stain. Spore size helps to distinguish species: those of *C. aeruginosa* are 11.5 x 3µm; those of *C. aeruginascens* are 7.5 x 2µm.

FRUITING Scattered or clustered on dead wood.

Dimensions CUP ⇔ 0.2–1cm | STEM ↕ 1–5mm ↔ 1–3mm	Spores White	Edibility

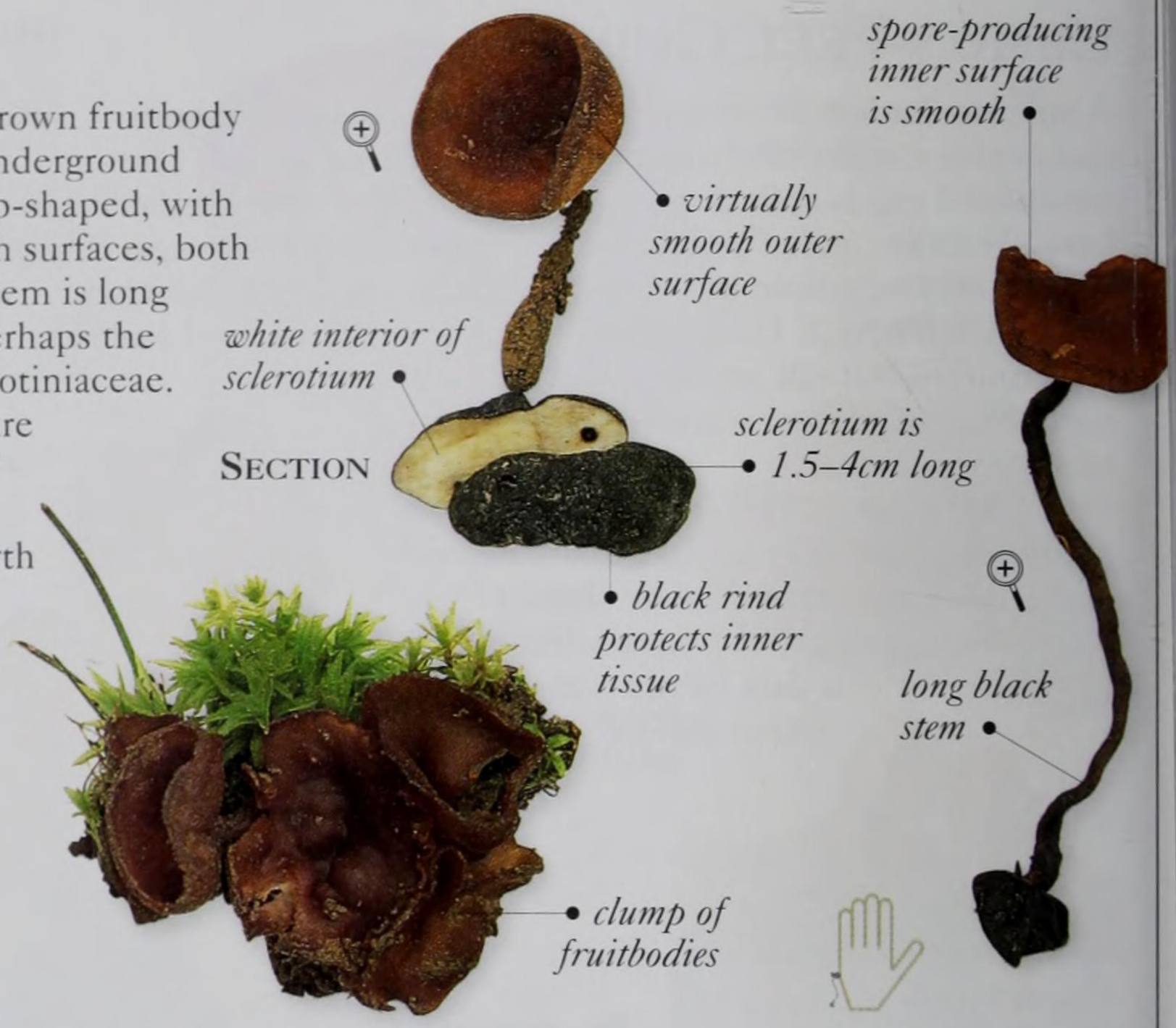
Family SCLEROTINIACEAE	Species *Dumontinia tuberosa*	Season Spring

TUBER CUP

This species has a chestnut-brown fruitbody that grows up out of a black underground organ, called a sclerotium. Cup-shaped, with a smooth margin, it has smooth surfaces, both inside the cup and out. The stem is long and black. This species has perhaps the largest fruitbodies in the Sclerotiniaceae.

• **OCCURRENCE** Sclerotia are formed inside the rhizomes of anemone species in Europe; reported on the ground in North America. Widespread; local to very common.

FRUITING In small groups in woodland on bare soil.



Dimensions CUP ⇹ 0.5–3cm | STEM ↕ 2–10cm ↔ 2–4mm	Spores White	Edibility

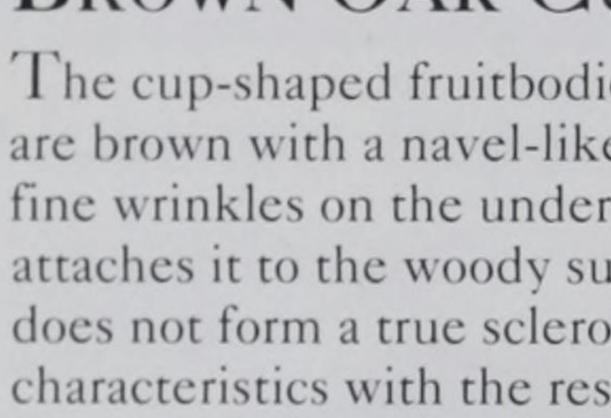
Family SCLEROTINIACEAE	Species *Rutstroemia firma*	Season Autumn

BROWN OAK CUP

The cup-shaped fruitbodies of this *Rutstroemia* species are brown with a navel-like center, smooth margin, and fine wrinkles on the underside of the disk. A stem attaches it to the woody substrate. Although this species does not form a true sclerotium, it shares other characteristics with the rest of the family. For example, it favors one specific host genus—in this case, oak trees. Smaller than *Dumontinia tuberosa* (above), it is still one of the larger species of Sclerotiniaceae.

• **OCCURRENCE** Found growing on fallen oak branches, turning the wood black. Widespread and fairly common in Europe.

• **SIMILAR SPECIES** In eastern US, the common species is *Rutstroemia (Ciboria) macropora*, which is smaller and grayer.



FRUITING Appears singly or in small groups.

Dimensions DISK ⇹ 0.5–1.5cm | STEM ↕ 0.2–1cm ↔ 0.2–2cm	Spores White	Edibility

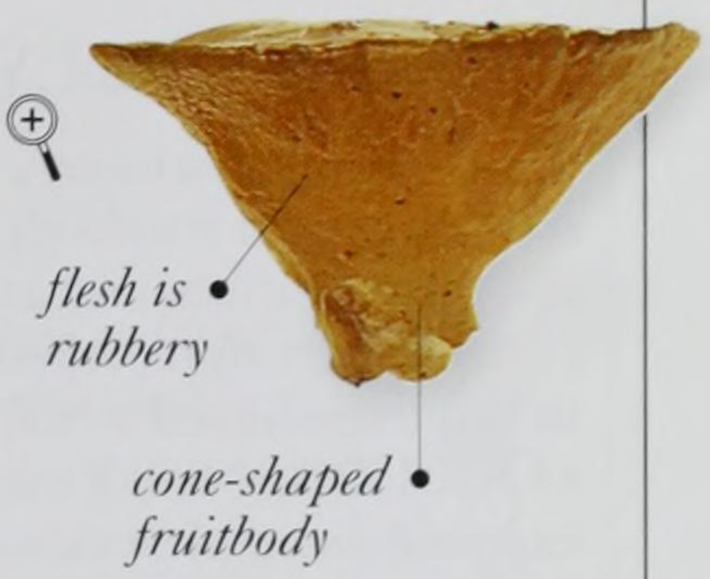
Family LEOTIACEAE	Species *Neobulgaria pura*	Season Late autumn

BEECH JELLY-DROP CUP

The fruitbodies of this fungus are pale pink, gelatinous, and translucent with a flat spore-producing surface and finely toothed margins. Tapering strongly to the base, they are cone-shaped in cross-section. Newly emerged specimens are very firm and rubbery. Exposure to the weather eventually makes them collapse and become much thinner, but they will persist from autumn into winter.

• **OCCURRENCE** On relatively fresh bark of fallen beech trunks and branches, often next to *Hypoxylon fragiforme* (p.257). Northern temperate zones; in most areas where beech occurs.

• **SIMILAR SPECIES** *Bulgaria inquinans* (below) is similar in habit and habitat but is harder and darker brown to black.



FRUITING In dense clusters on beech bark.

Dimensions DISK ⇹ 0.5–3cm ↕ 1cm	Spores White	Edibility

Family LEOTIACEAE	Species *Bulgaria inquinans*	Season Autumn–winter

BLACK JELLY-DROP CUPS

The disk-shaped mature fruitbodies of this licorice-like fungus are black, sometimes appearing blue. Unusual for the Leotiaceae, the spores here are very conspicuous and jet black; the nearby bark may be black with ejected spores, and touching the fruitbody produces black smudges on the fingers. Of the eight spores formed within each ascus (see pp.10–11), only the top four develop the dark coloring. The staining property of the spores has been used for dyeing wool.

• **OCCURRENCE** On the bark of recently fallen trunks of beech or oak trees; mostly on the upper surface. Widespread and common where host trees occur in northern temperate zones.

• **SIMILAR SPECIES** *Exidia glandulosa* (p.283), a true jelly mushroom, is even more jellylike and can revive after drying out.

SECTION

FRUITING Appears in swarms on beech or oak bark.

Dimensions DISC ⇹ 0.5–4cm ↕ 0.5–2cm	Spores Jet black	Edibility

Family LEOTIACEAE	Species *Ascocoryne cylichnium*	Season Autumn–winter

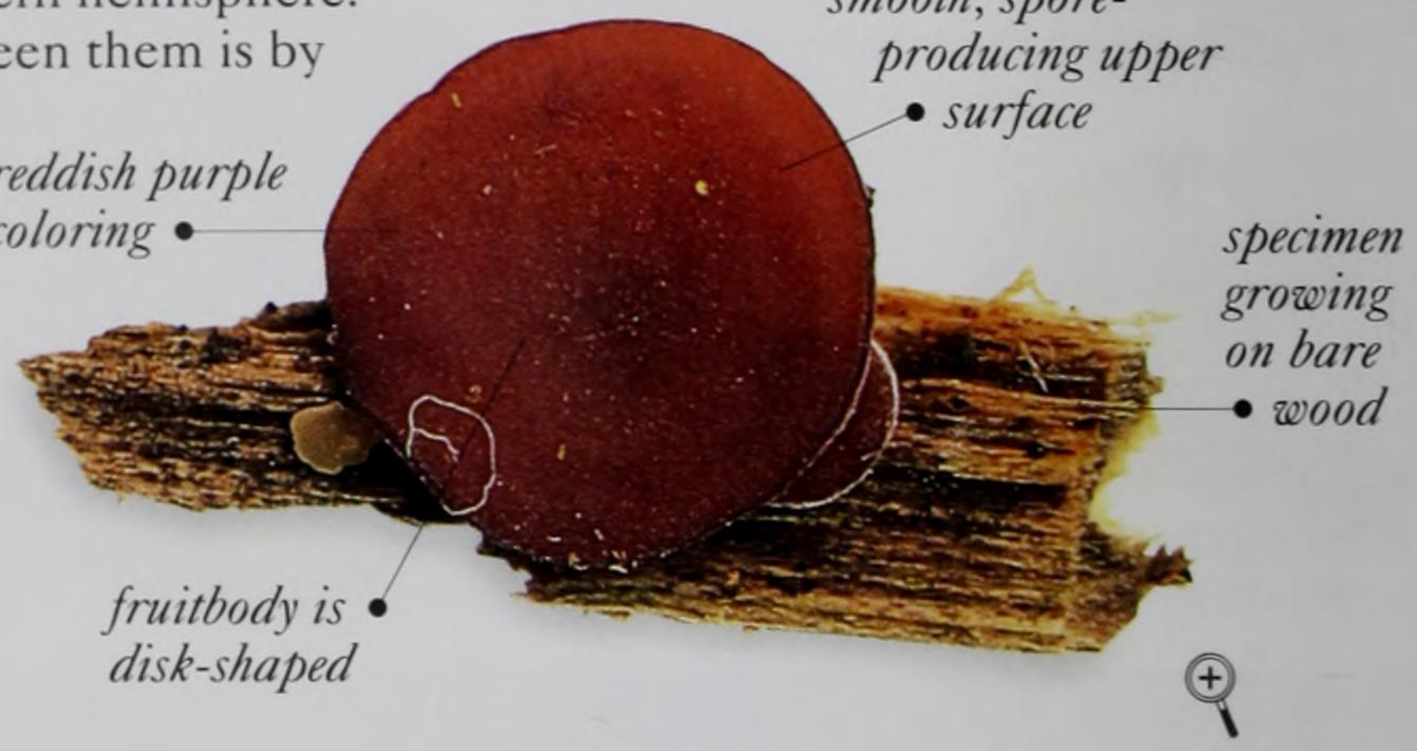
PURPLE JELLY-DROP CUP

This species produces a disk-shaped, gelatinous, reddish purple fruitbody with a smooth, shiny, spore-producing surface and an often irregularly lobed margin. It has a short stem, which makes the fruitbody appear to be cone-shaped when viewed from the side.

• **OCCURRENCE** Found growing on the bark and exposed wood of deciduous trees. Widespread and fairly common in northern temperate zones.

• **SIMILAR SPECIES** *Ascocoryne sarcoides* (below) has narrower disks and shorter spores. Several other smaller species occur in the northern hemisphere. The best way to distinguish between them is by microscopic examination of such features as the spores.

FRUITING In swarms on tree stumps and branches.



Dimensions DISC ⇹ 0.5–2cm ↕ 2–4mm | STEM ↕ to 5mm ↔ to 2mm	Spores White	Edibility

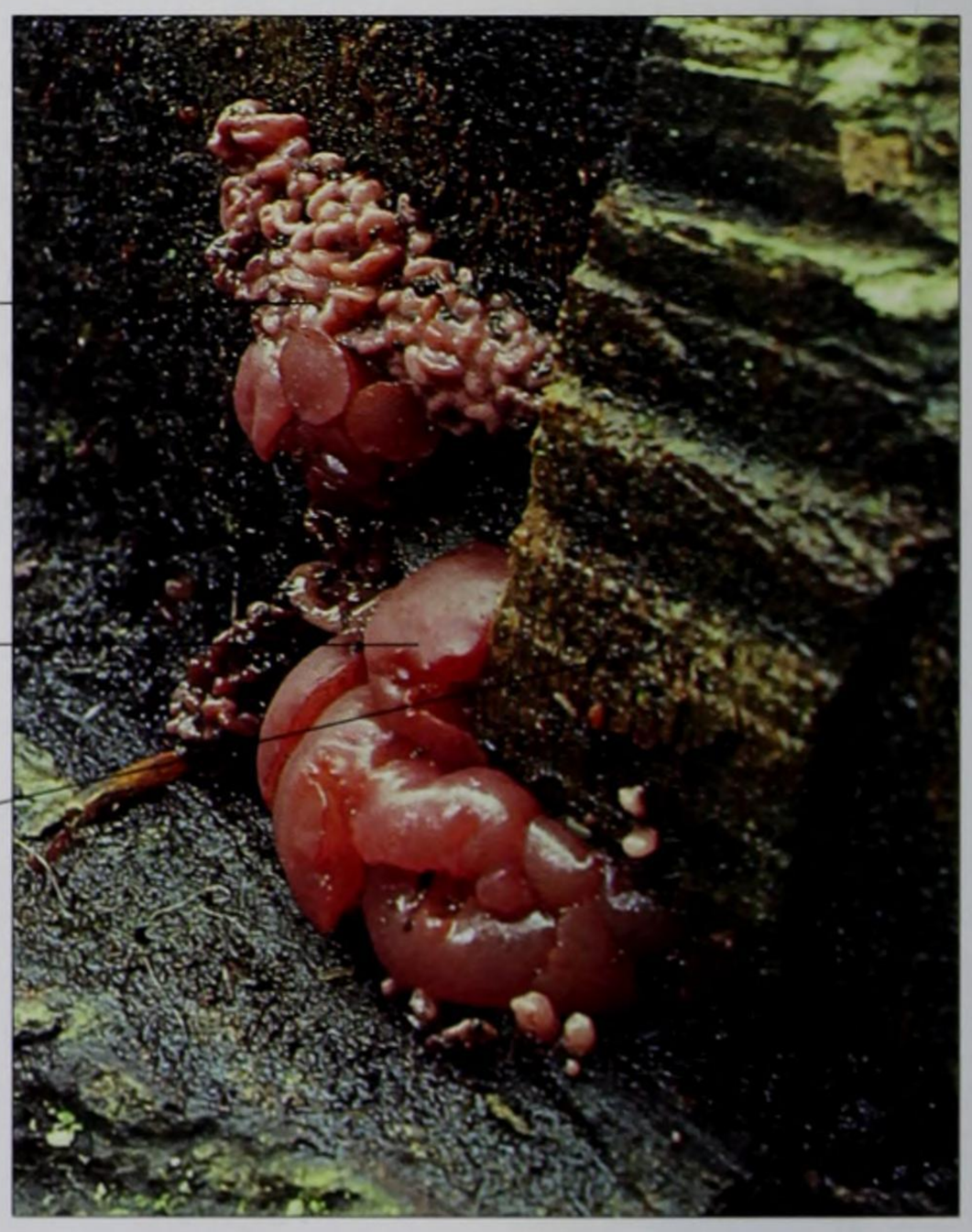
Family LEOTIACEAE	Species *Ascocoryne sarcoides*	Season Autumn–winter

BRAIN JELLY-DROP CUP

The disk-shaped, gelatinous, reddish purple fruitbody of this species may have a rudimentary stem. Along with the disk-shaped fruitbodies, brainlike asexual growths appear. They are paler and grayer.

• **OCCURRENCE** Mostly on bare deciduous stumps or trunks. Widespread and common in parts of northern temperate zones, and probably elsewhere.

• **SIMILAR SPECIES** *Ascocoryne cylichnium* (above) is best distinguished by microscopic examination. Its spores are larger and normally more than 3-septate at maturity. *A. turficola* is much rarer and more colorful and grows on sphagnum moss. *Ascotremella faginea* (p.283) has larger, brainlike fruitbodies.



FRUITING In clusters or singly, often with the asexual and fertile state appearing together.

Dimensions DISC ⇹ 0.2–1cm ↕ 1–4mm	Spores White	Edibility

Family LEOTIACEAE	Species *Bisporella citrina*	Season Autumn–early winter

LEMON CUP

The clustered habit and vivid yellow color of this tiny species enable it to be seen from a distance. The disks have a smooth, flat or slightly concave upper surface and a paler lower surface. White disks may occur. There is no true stem.

• **OCCURRENCE** Found growing on fallen deciduous wood, often beech, oak, and hazel; mostly grows on wood that lacks its bark. Widespread and very common throughout northern temperate zones.

• **SIMILAR SPECIES** Some species of *Bisporella* have fruitbodies that occur near or on top of their blackish, powdery asexual form, called *Bispora*. There are a number of other closely related yellow cup-fungi. Some may have a stem or may differ only in microscopic features.

FRUITING Appears in conspicuous swarms on wood.

Dimensions DISC ⇔ 1–3mm ↕ less than 1mm	Spores White	Edibility

Family CORTICIACEAE	Species *Aleurodiscus amorphus*	Season All year

ORANGE DISCUS MUSHROOM

Although it looks like a cup-fungus, this skin-fungus is tougher and more leathery than many cup-fungi. The disk is pinkish orange with a mealy surface and a fringed white margin. It is firmly attached to the substrate at a point beneath its center. A gelatinous, transparent or white blob indicates that it has been parasitized by a species of *Tremella* such as *T. simplex*.

• **OCCURRENCE** On bark-clad fir or, more rarely, spruce. Widespread and fairly common across northern North America and Europe.

• **SIMILAR SPECIES** The cup-fungus *Lachnellula subtilissima* is hairier, brighter orange, and has a more distinct stem.

FRUITING Appears in massed, attached fruitings during damp periods.

Dimensions CUP ⇔ 1–8mm ↕ 2–3mm	Spores White	Edibility

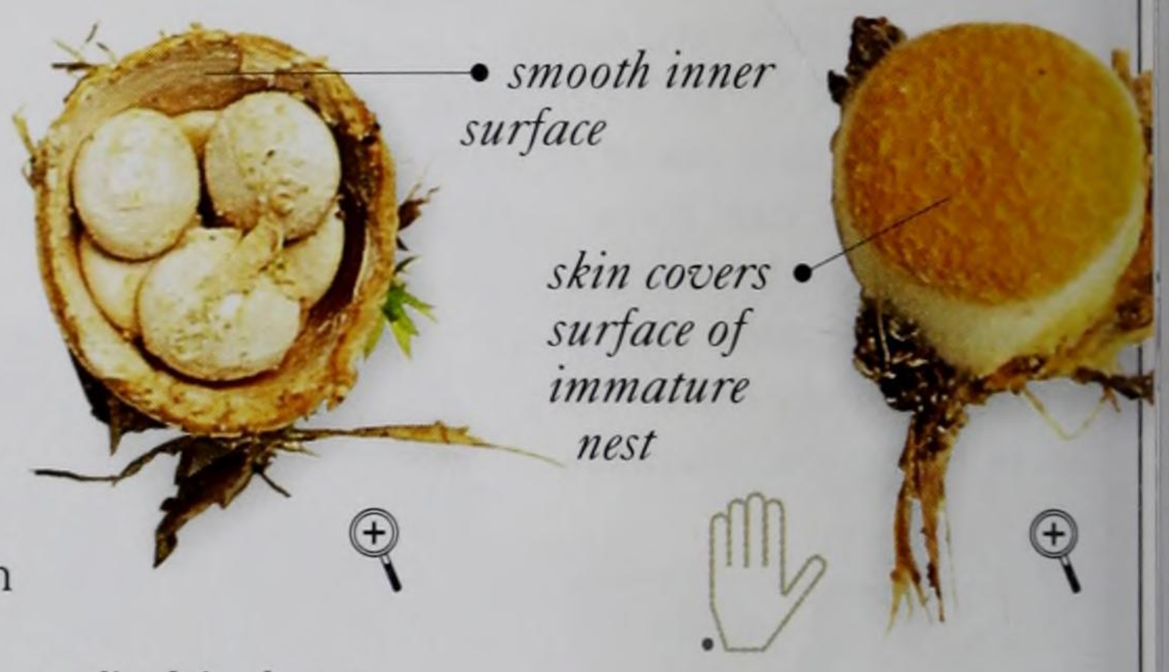
CUP-SHAPED CONTAINING "EGGS"

THE FUNGI here have unique fruitbodies consisting of a "cup," inside of which are tiny structures called peridioles. These contain the spore-producing hymenium. Initally, a protective skin covers the top of the "cup." It disappears at maturity and the peridioles are dispersed by raindrops.

Family NIDULARIACEAE	Species *Crucibulum crucibuliforme*	Season Autumn

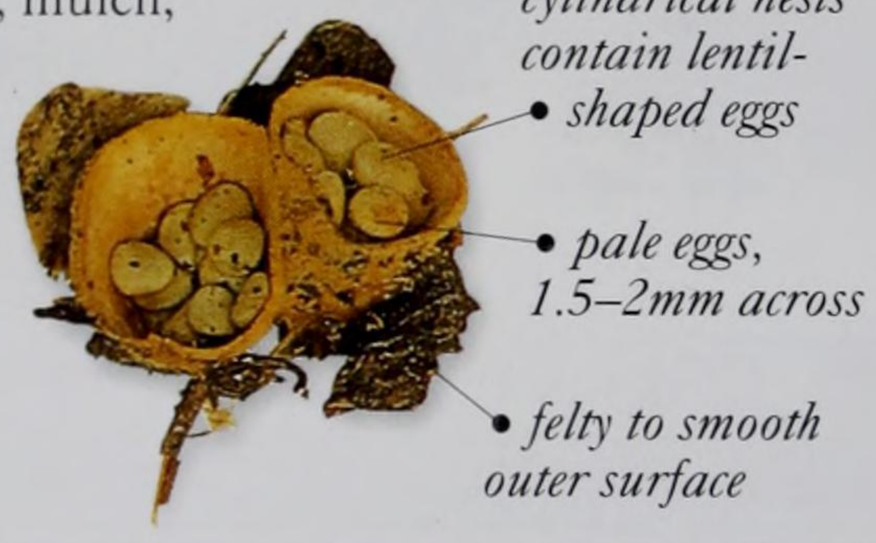
WHITE-EGG BIRD'S NEST

This species is the only member of the *Crucibulum* genus. It has cylindrical, nestlike, ocher-orange fruitbodies within which there are 10–15 (up to 20) lentil-shaped white eggs that contain the spores. Each egg is attached to the nest by a tiny cord. The outer surface of the nest is felty to smooth. Immature nests are covered with a protective ocher-orange skin; when this withers, the eggs are dispersed by raindrops.



• OCCURRENCE On litter, mulch, and sawdust, in woods and gardens. Widespread and fairly common in northern temperate zones.

• SIMILAR SPECIES *Cyathus* species have cone-shaped fruitbodies and eggs that are darker in color.



FRUITING In troops on decaying vegetation.

Dimensions CUP ⇔ 5–8mm ↕ 0.5–1cm	Spores White	Edibility

Family NIDULARIACEAE	Species *Cyathus striatus*	Season Throughout autumn

FLUTED BIRD'S NEST

Grooved striations inside the nestlike fruitbody are the most distinctive feature of this species. On the outside, the nests are coated in brown fur. A thin skin covers the nest surface until maturity, when it breaks open; the eggs are dispersed by raindrops splashing into the cups. A slimy thread released at the same time enables the eggs to attach to nearby vegetation.

• OCCURRENCE In woods, often deep in litter. Widespread and common in northern temperate zones.

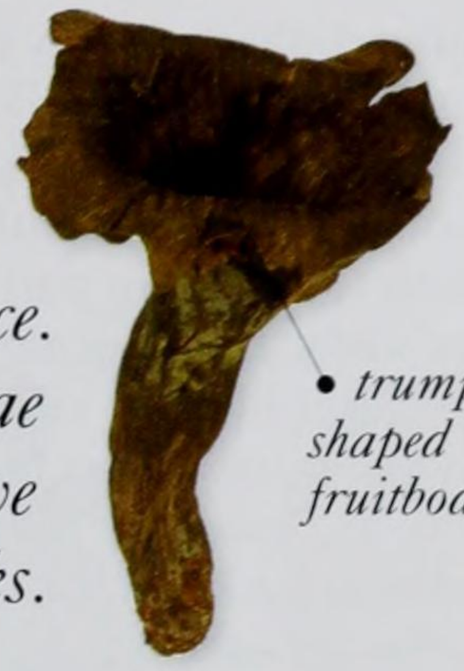
• SIMILAR SPECIES *Cyathus olla* lacks striations and occurs mainly in open habitats. *C. stercoreus* grows on dung and has very dark eggs and no striations. There are additional species in North America, Japan, and the tropics.

FRUITING In clusters on half-buried wood.

Dimensions CUP ⇔ 6–8mm ↕ 0.8–1.5cm	Spores White	Edibility

TRUMPET-SHAPED FUNGI

The fungi featured in this section have trumpet-shaped, hollow fruitbodies with the spore-producing hymenium lining the more or less smooth outer surface. Most of the species here belong to the Cantharellaceae family (see also pp.28 and 30). The fruitbodies have fairly tough flesh and may persist for several weeks.



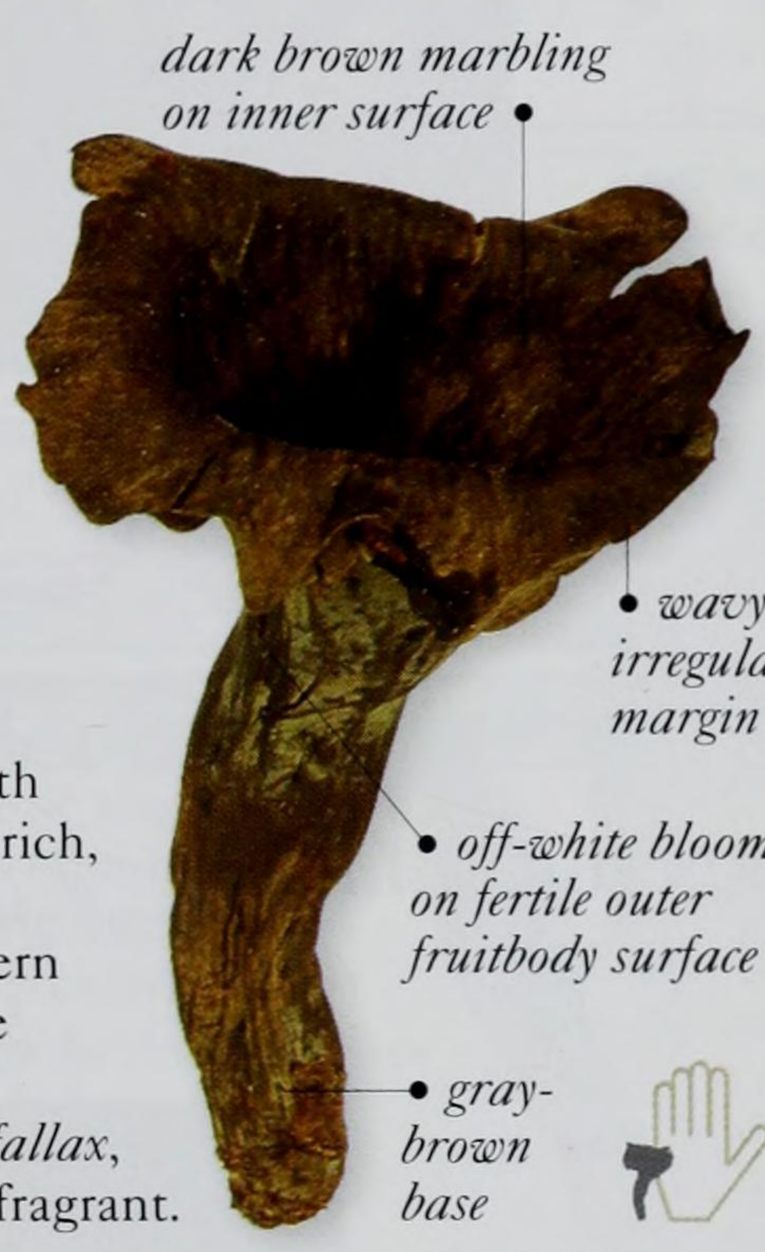
Family CANTHARELLACEAE	Species *Craterellus cornucopioides*	Season Summer–autumn

BLACK TRUMPET

The fruitbody of this dark brown chanterelle is hollow and trumpet-shaped, tapering toward the base. The outer side has a paler gray spore-bearing layer. The thin gray flesh is mild and pleasant tasting with an aromatic smell. Its dark coloring makes it difficult to spot at first, but where found it typically occurs en masse.

• **OCCURRENCE** Mycorrhizal with deciduous trees in woods, on fairly rich, often calcareous soil; more rarely with conifers. Widespread in northern temperate zones; abundant in some areas, but almost absent in others.

• **SIMILAR SPECIES** *Craterellus fallax*, a North American species, is more fragrant.



FRUITING Appears in troops and small clusters.

Dimensions FRUITBODY ⊕ 3–10cm ↕ 5–12cm | BASE ↔ 0.5–2cm	Spores White	Edibility

Family CANTHARELLACEAE	Species *Cantharellus lutescens*	Season Early autumn–early winter

GOLDEN CHANTERELLE

This chantarelle has a somewhat funnel-shaped, yellow-brown fruitbody. It has a hollow, yellow-orange base, and rather thin, pale yellow flesh with a fruity smell. The pale spore-producing layer on the outer surface is almost smooth, resembling those of *Craterellus* species (above).

• **OCCURRENCE** Mycorrhizal with deciduous trees and conifers in damp, moss-rich woods. Widespread but rather local in temperate and warm-temperate regions, including North America, Europe, and Asia.

• **SIMILAR SPECIES** *C. tubaeformis* var. *lutescens* has distinct, veinlike gills on the outer surface.

FRUITING Appears in troops among mosses in damp forests.

Dimensions FRUITBODY ⊕ 2–7cm ↕ 3–7cm | BASE ↔ 3–8mm	Spores Pale cream	Edibility

Family CANTHARELLACEAE	Species *Cantharellus lateritius*	Season Summer–autumn

SMOOTH CHANTERELLE

Trumpet-shaped with a pendent, wavy margin, this orange-yellow species is closely related to *Cantharellus cibarius* (p.28), and differs from it mainly in having a smooth to faintly or partly veined outer surface. It is generally denser and stouter but just as fragrant, with the same taste. It was formerly known as *Craterellus cantharellus*, because it looks like *C. cornucopioides* (p.275) but with chanterelle colors.

smooth or nearly smooth undersurface

• **OCCURRENCE** Under oaks. Widespread and very common in eastern North America.

• **SIMILAR SPECIES** *C. cibarius* (p.28), has well-formed, forked, gill-like folds on its outer surface. *C. odoratus* appears in dense, flowerlike clusters.

FRUITING Appears singly or in large numbers on the ground under oak trees in open woods and parks.

Dimensions FRUITBODY ↔ ↕ 2.5–10cm | BASE ↔ 0.5–2.5cm	Spores Pale yellow-orange	Edibility

Family GOMPHACEAE	Species *Gomphus floccosus*	Season Summer–autumn

SCALY VASE CHANTERELLE

This large, trumpet-shaped species is brightly colored, making it easy to spot in open woods. It has a variably scaly, red-orange to orange-yellow cap. The flesh has the same strong coloring. The decurrent veined spore-producing surface is creamy white to ocher. This mushroom and its related look-alikes should not be eaten because they contain an indigestible acid.

scales on cap surface are red-orange

creamy white to ocher spore-producing surface

tapering, stemlike base

• **OCCURRENCE** On the ground under conifers and in mixed wooded areas. Widespread and common throughout North America.

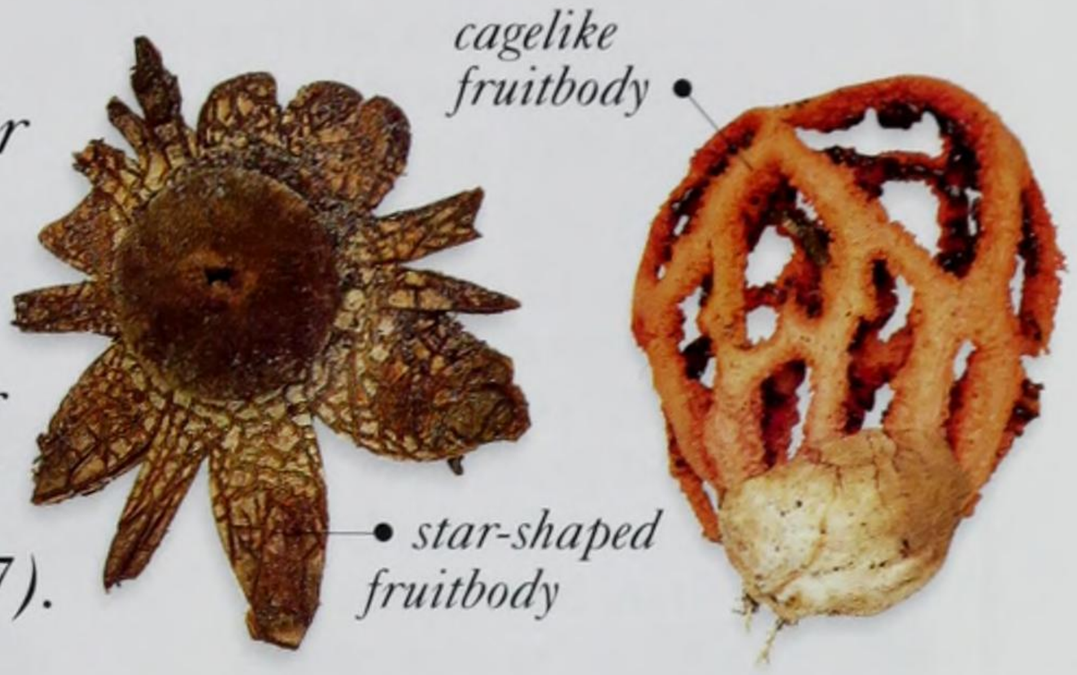
• **SIMILAR SPECIES** *Gomphus bonarii* is bright red with a milk-white spore-producing surface. *G. kauffmanii* is larger, more coarsely scaly, and yellowish tan.

FRUITING Singly or in large groups of fruitbodies on the ground under conifers and in mixed woods.

Dimensions FRUITBODY ↔ 5–15cm ↕ 5–10cm | BASE ↔ 1.5cm	Spores Ocher-yellow	Edibility

STAR-SHAPED & CAGELIKE FUNGI

These fungi are called gasteroids because their spore-tissue (gleba) is enclosed, stomachlike, in the fruitbody. The earth stars (p.278–80) have fruitbodies that split into a star with an inner spore-ball. The two Clathrus *species (below and p.280) are related to stinkhorns (pp.246–47).*



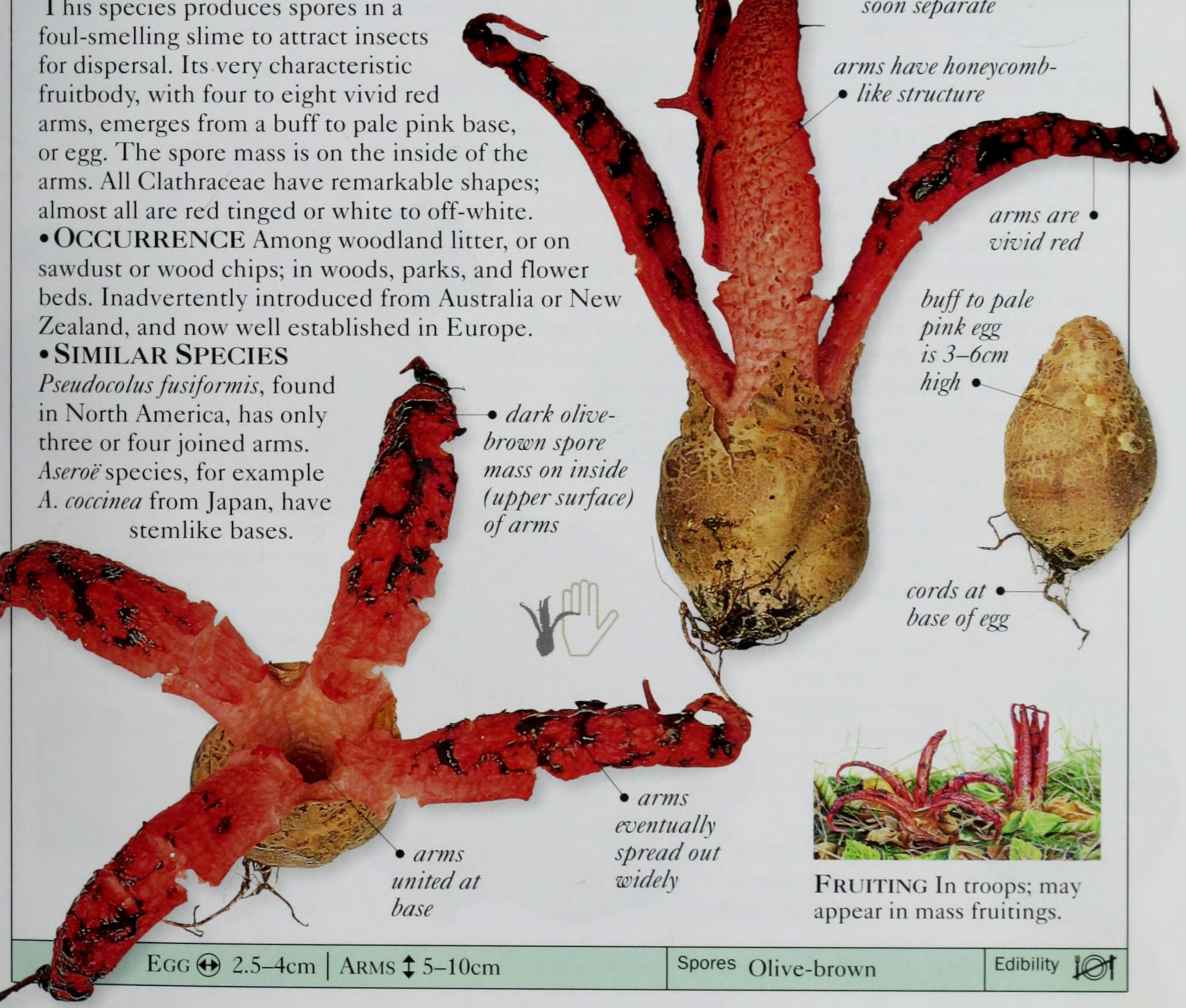
Family CLATHRACEAE	Species *Clathrus archeri*	Season Summer–autumn

ARMED STINKHORN

This species produces spores in a foul-smelling slime to attract insects for dispersal. Its very characteristic fruitbody, with four to eight vivid red arms, emerges from a buff to pale pink base, or egg. The spore mass is on the inside of the arms. All Clathraceae have remarkable shapes; almost all are red tinged or white to off-white.

• **OCCURRENCE** Among woodland litter, or on sawdust or wood chips; in woods, parks, and flower beds. Inadvertently introduced from Australia or New Zealand, and now well established in Europe.

• **SIMILAR SPECIES**
Pseudocolus fusiformis, found in North America, has only three or four joined arms. *Aseroë* species, for example *A. coccinea* from Japan, have stemlike bases.



FRUITING In troops; may appear in mass fruitings.

EGG ⇹ 2.5–4cm | ARMS ↕ 5–10cm	Spores Olive-brown	Edibility

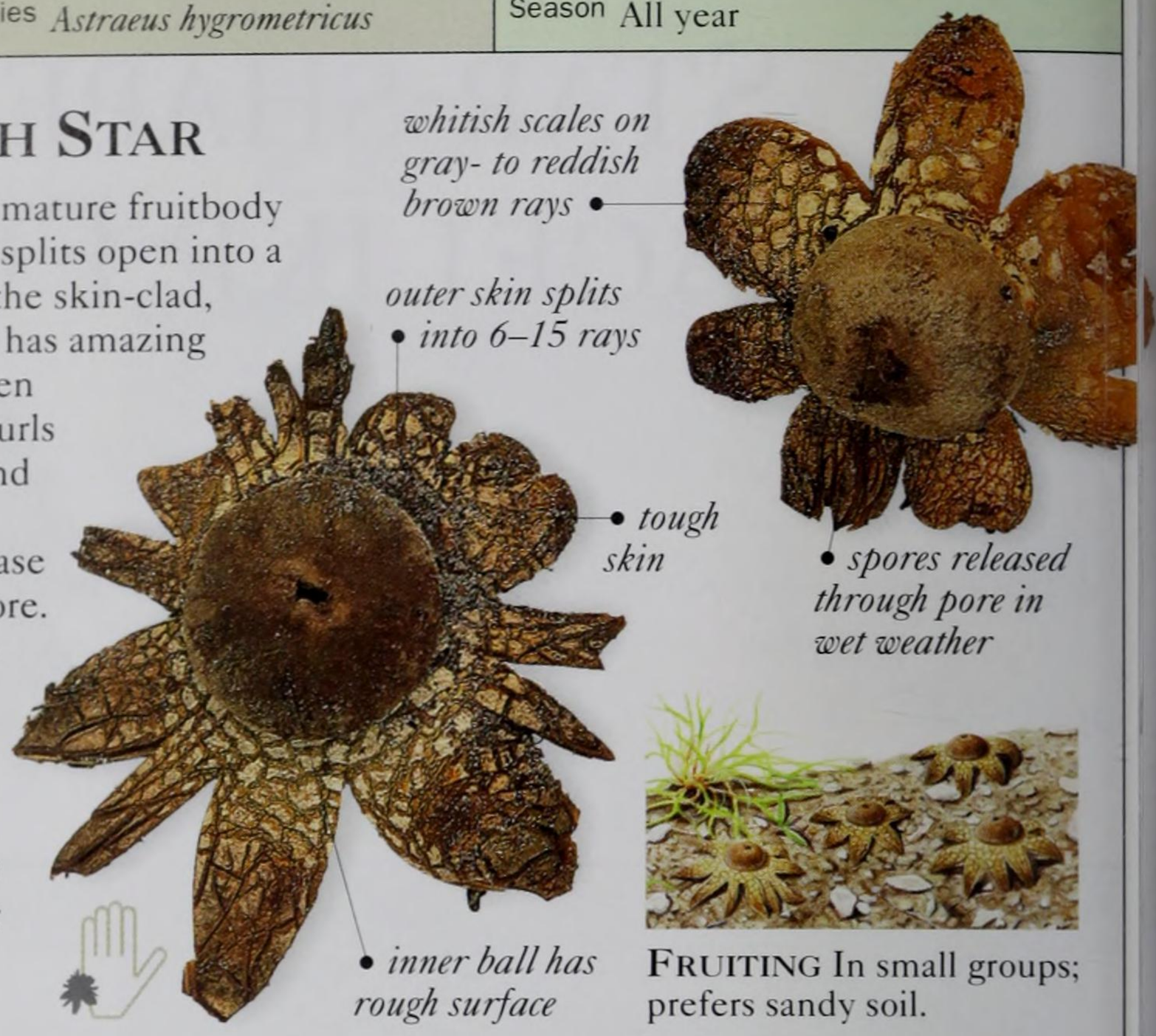
Family SCLERODERMATACEAE	Species *Astraeus hygrometricus*	Season All year

BAROMETER EARTH STAR

The rounded, reddish brown immature fruitbody of this metallic-smelling species splits open into a star shape on maturity to reveal the skin-clad, gray-brown, spore-ball within. It has amazing hygroscopic properties, even when detached from its mycelium: it curls back into a ball in dry weather and expands its rays in wet weather. Rain splashes are needed to release the spores through the central pore.

• **OCCURRENCE** Mycorrhizal; mostly found growing in dry, open woodland. Virtually cosmopolitan, but absent in cold-temperate to arctic areas.

• **SIMILAR SPECIES** *Geastrum* species (below, pp.279–80) differ in such microscopic details as elastic threads in the spore-ball.



FRUITING In small groups; prefers sandy soil.

Dimensions FRUITBODY ⟷ 5–9cm | INNER BALL ⟷ 1.5–3cm	Spores Brown	Edibility

Family GEASTRACEAE	Species *Geastrum triplex*	Season Autumn

COLLARED EARTH STAR

A widely distributed *Geastrum* species, the Collared Earth Star is large and fleshy. On maturity, the onion-shaped fruitbody splits open, typically in two layers, an outer star shape and an inner collar, around a central ball. A pore on top of the ball allows the spores to be released by splashes of rain.

• **OCCURRENCE** In gardens, parks, and woods. Widespread in warmer regions in the northern temperate zones; almost cosmopolitan.

• **SIMILAR SPECIES** *G. fornicatum* lacks a collar; its ball sits atop arched limbs attached to a partially buried mycelial disk. The ball of *Myriostoma coliforme* has many holes through which the spores are released.

FRUITING In groups or fairy rings on rich soil.

Dimensions FRUITBODY ⟷ 4–12cm | INNER BALL ⟷ 2–4cm	Spores Chocolate-brown	Edibility

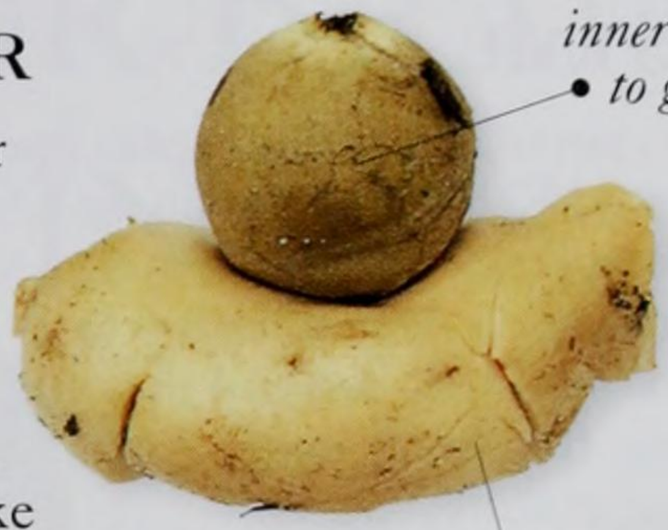
Family GEASTRACEAE	Species *Geastrum fimbriatum*	Season Autumn

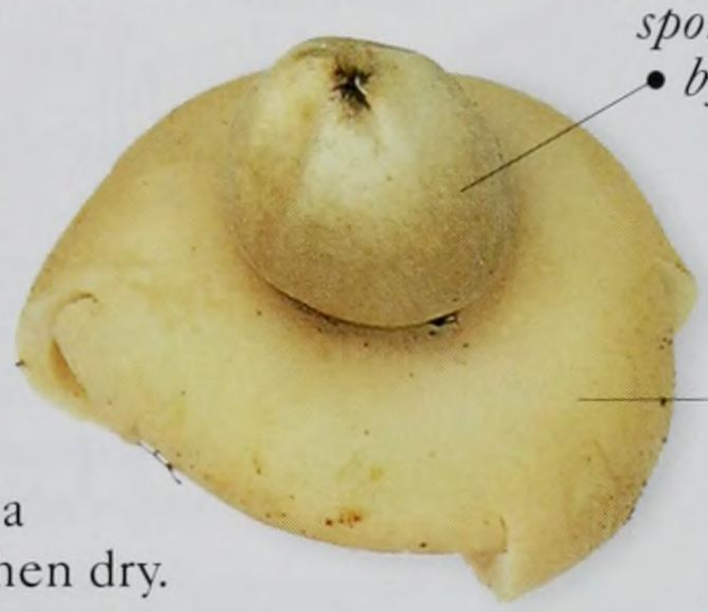
SESSILE EARTH STAR

The globe-shaped, yellow-brown or pale brown fruitbody of the Sessile Earth Star opens on maturity, its outer skin splitting into a star shape. Inside is a pale gray to gray-buff ball, which contains the spores. Raindrops splashing on the ball make it contract, releasing the spores through a hole on the top, which is edged with fine hairs (fimbriate).

• **OCCURRENCE** Mostly on litter on calcareous soil, under trees. Widespread in northern temperate zones; common throughout eastern North America.

• **SIMILAR SPECIES** *Geastrum triplex* (p.278) is often found on similar sites; its outer skin splits into a star, and a collar surrounds the inner ball. *G. rufescens* is pink hued and develops a stalk on the inner ball when dry.





FRUITING Appears in small groups or fairy rings.

Dimensions FRUITBODY ⟷ 3–6cm | INNER BALL ⟷ 1–2.5cm	Spores Chocolate-brown	Edibility

Family GEASTRACEAE	Species *Geastrum schmidelii*	Season Autumn

DWARF EARTH STAR

This earth star is identified by its habitat and size. The inner spore-ball, which is exposed when the fruitbody splits open, has a beaklike, furrowed, and striated mouth. The immature brown fruitbody is nearly spherical and is usually encrusted with sand and debris; the fleshy skin splits open to form five to eight rays, which become papery when mature. The inner ball is gray-brown.

• **OCCURRENCE** On sand in fields and dunes or in open parts of coniferous forests on sandy soil. Widespread in Europe and neighboring parts of Asia; reported in southeastern and midwestern North America.

• **SIMILAR SPECIES** *Geastrum elegans* has a stemless inner ball. *G. pectinatum*, which grows with conifers, is larger; its inner ball has a grainy skin and a more distinct stem.

FRUITING In rings or groups of a few fruitbodies together.

Dimensions FRUITBODY ⟷ 1.5–3.5cm | INNER BALL ⟷ 0.5–1.5cm	Spores Chocolate-brown	Edibility

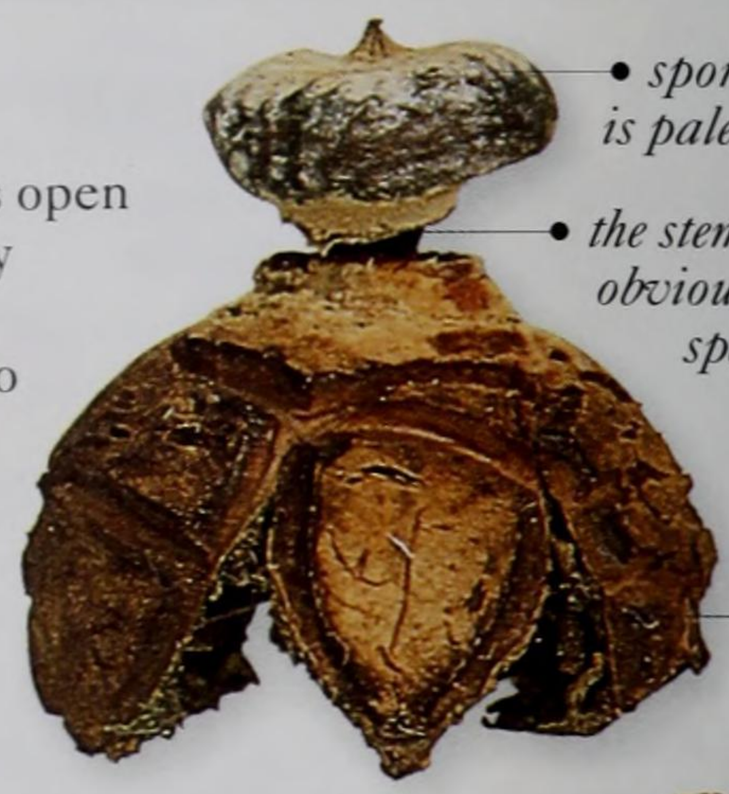
Family GEASTRACEAE	Species *Geastrum striatum*	Season Autumn

STRIATED EARTH STAR

Like other earth stars, the outer skin of this species splits open to reveal a spore-ball. In the Striated Earth Star, the finely grainy, grayish white ball has a short stem, inserted into a collarlike rim. The immature fruitbody is near-spherical to onion-shaped and is strongly encrusted with soil and the debris of its habitat. After opening, the fleshy, gray-brown rays soon become papery in texture.

• OCCURRENCE On fertile soil, often under conifers in gardens and parks; also in mixed forest. Widespread in Europe; world distribution unclear.

FRUITING In lines, rings, or a few together on mixed litter.



Dimensions FRUITBODY ⟷ 3–6.5cm | INNER BALL ⟷ 1–2.5cm	Spores Chocolate-brown	Edibility

Family CLATHRACEAE	Species *Clathrus ruber*	Season All year

CAGED STINKHORN

When mature, this mushroom turns a brilliant red and develops a spherical, cagelike structure. It emerges from a white or buff egg. Inside, the cage bars are smeared with an olive-brown spore mass, the foul smell of which attracts insects for spore dispersal.

• OCCURRENCE On leaf and wood litter, in parks and gardens; prefers warmth. Widespread but scattered; mostly in Mediterranean areas.

• SIMILAR SPECIES There are about 17 *Clathrus* species. They are mainly tropical. Some are bright red, others are white.

FRUITING Appears in small groups or troops.

Dimensions FRUITBODY ⟷ to 9cm ↕ to 12cm	Spores Olive-brown	Edibility

EAR- OR BRAINLIKE, GELATINOUS FUNGI

Most of the fungi featured in this section have gelatinous flesh. They desiccate in dry weather but rehydrate when wet and then continue to shed spores. Their shape varies from brainlike, with the spore-bearing tissue (hymenium) all over, to pendent and earlike, with the hymenium lining the inside and facing downward.

Family AURICULARIACEAE	Species *Auricularia auricula-judae*	Season All year

WOOD EAR JELLY

The fruitbody of this species is distinctively ear-shaped. It is gelatinous and smooth when fresh, but becomes hard and folded as it matures and dries out. The outer surface is tan-brown and covered in downy hairs, while the inner, spore-producing surface is more gray in color, veined, and wrinkled. Considered a bland edible in the West, this fungus and related species are valued as both a food and a medicine in China.

• **OCCURRENCE** On deciduous trees, often elder, in damp woods. Widespread in warmer parts of northern temperate zones.

• **SIMILAR SPECIES** *Auricularia polytricha* is the same color or darker, and its upper surface is very velvety. It is found mainly in the tropics.

FRUITING Singly or in crowded tiers and rows.

Dimensions FRUITBODY ↔ 4–12cm ↕ to 2mm	Spores White	Edibility

Family TREMELLACEAE	Species *Tremella mesenterica*	Season Mostly late autumn–winter

YELLOW BRAIN JELLY

The striking, almost transparent yellow coloring of the Yellow Brain Jelly makes it very easy to see. Prolonged rainfall can turn it white, but occasionally it may also produce true albino forms. In dry weather the fruitbody shrivels up, but it will rehydrate when moist conditions return. Although the flavor is very bland, this species can be eaten or used in soups.

• OCCURRENCE Parasitic on Corticiaceae species; growing on deciduous branches, often in piles of brushwood. Widespread and common in northern temperate zones.

FRUITING Mainly in small groups of lobed fruitbodies.

Dimensions JOINED FRUITBODIES ↔ 1–6cm ↕ 0.5–4cm	Spores White	Edibility

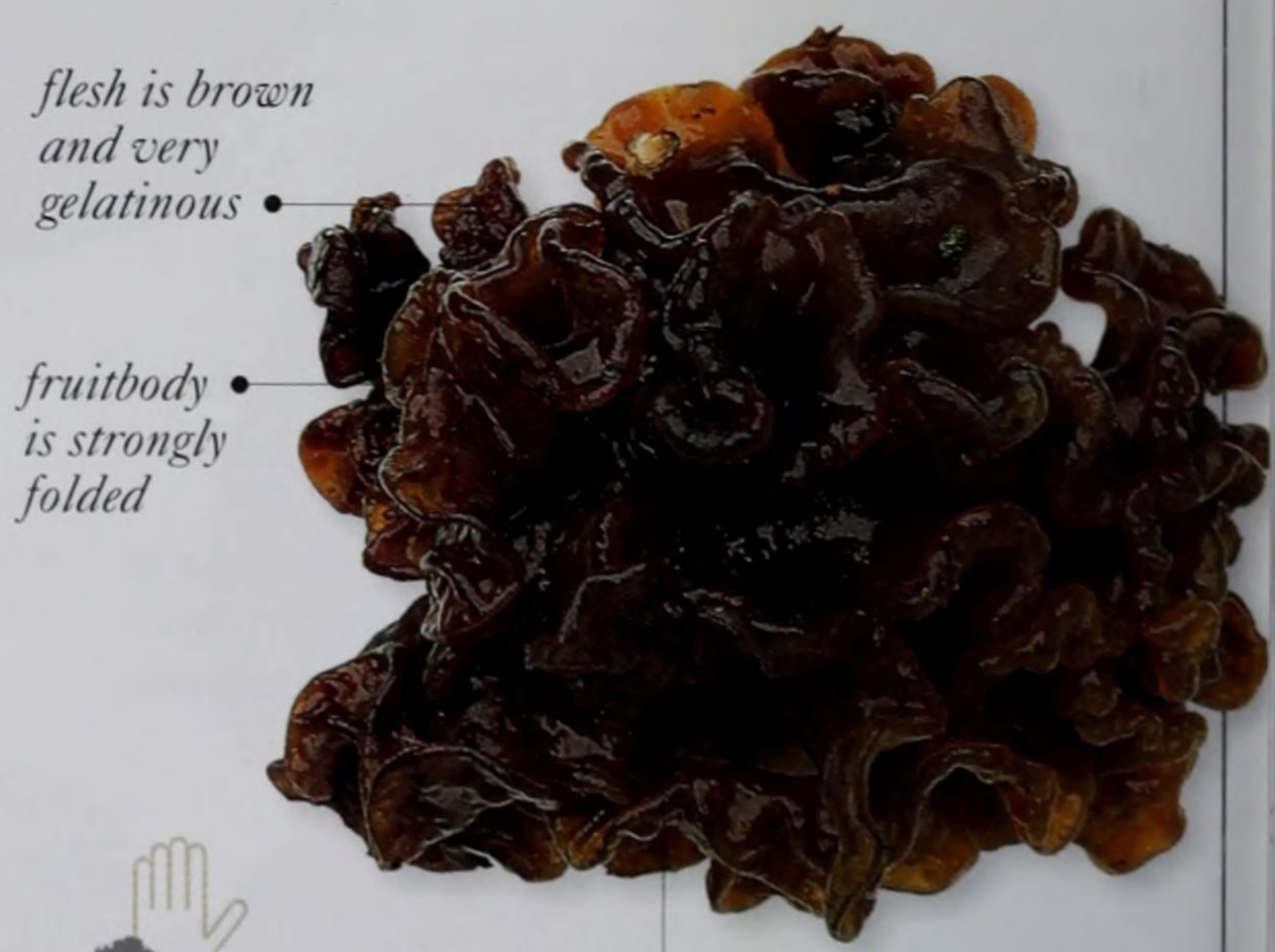
Family TREMELLACEAE	Species *Tremella foliacea*	Season Autumn–winter

BROWN LEAFY JELLY

A strongly folded, gelatinous brown fruitbody, attached directly to bark with no stem, make this species easy to identify. The spores, produced on microscopic club-shaped basidia (p.11), cover the surface of the fruitbody.

• OCCURRENCE Parasitic on species of *Stereum* and Corticiaceae on deciduous trees, but also on pine, in parks and woods. Widespread in northern temperate zones.

• SIMILAR SPECIES *Ascotremella faginea* (p.283) and a folded form of *Neobulgaria pura* (p.271); they are distinguished by more rounded, brainlike lobes and spores in the asci (p.11).



FRUITING Appears singly or a few together.

Dimensions FRUITBODY ↔ 4–12cm ↕ 3–7cm	Spores White	Edibility

Family TREMELLACEAE	Species *Exidia glandulosa*	Season Late autumn–winter

BLACK BRAIN JELLY

Looking like blobs of tar, this jelly-fungus is comparatively firm and less gelatinous to touch than *Tremella mesenterica* (p.282). The brainlike surface consists of numerous folds that become deeper and more wrinkled with age. As with most other jelly-fungi, wet weather causes shriveled, dried-up specimens to rehydrate.

• **OCCURRENCE** On bare to bark-clad wood of deciduous trees. Widespread and common in northern temperate zones.

• **SIMILAR SPECIES** *E. truncata* is also common and is found mainly on oak trees. Its fruitbody is more button-shaped with a fine velvety outer surface and a pimpled fertile surface. *E. recisa* is yellow-brown.

black surface with numerous brainlike folds

mature specimen has even more marked folds and wrinkles

shriveled specimen is revived by moisture

FRUITING Appears in linked fruitbodies.

spores produced all over exposed surface

spreading fruitbodies may fuse together

Dimensions JOINED FRUITBODIES ↔ 2–10cm ↕ 0.5–1.5cm	Spores White	Edibility

Family LEOTIACEAE	Species *Ascotremella faginea*	Season Summer–autumn

RAISIN JELLY CUP

This dingy purple fungus is most often seen in large, shiny, jellylike groups, up to 10cm across. The fruitbody consists of a mass of gelatinous, irregularly shaped blobs, the whole effect being almost brainlike. It is attached to the substrate by a short, stemlike point. It looks like a jelly-fungus, but microscopic characteristics, such as spores produced in cylindrical asci (pp.10–11), identify it as a cup-fungus.

• **OCCURRENCE** Typically on dead beech, but also on other deciduous trees. Widespread and locally common in northeastern North America and most of Europe.

dingy purple fruitbodies

spores produced all over surface of fruitbody

fruitbody has jellylike texture

brainlike, irregular fruitbody

FRUITING Mostly singly or a few together on branches and trunks of dead deciduous trees.

Dimensions FRUITBODY ↕ 1–2cm ↔ 2–4cm	Spores White	Edibility

SPORE CHART

SPORES occur in many colors, shapes, surface textures, and sizes, and offer important clues to precise identification of a species. Spore color is included with each species main entry; size and shape are given in the table below. Spores vary from 2 to 500 microns (µm); average sizes are given here. A microscope is necessary to determine size and shape (see p.17). In the table below, ⊕ means diameter.

SPECIES	SIZE (µm)	SHAPE
Agaricus arvensis	7 × 5	broadly ellipsoid
Agaricus augustus	8.5 × 5	ellipsoid
Agaricus bernardii	6.5 × 5.5	broadly ellipsoid
Agaricus bisporus	6 × 5	broadly ellipsoid
Agaricus bitorquis	6 × 4.5	broadly ellipsoid
Agaricus californicus	5.5 × 4.5	ellipsoid
Agaricus campestris	8 × 4.5	ellipsoid
Agaricus hondensis	5 × 3.5	ellipsoid
Agaricus porphyrizon	5 × 3.5	ellipsoid
Agaricus praeclaresquamosus	5.5 × 3.5	broadly ellipsoid
Agaricus sylvaticus	5.5 × 3.5	broadly ellipsoid
Agaricus sylvicola	7 × 4.5	ellipsoid
Agaricus xanthoderma	6 × 4	ellipsoid
Agrocybe cylindracea	10 × 5.5	ellipsoid with a pore
Agrocybe pediades	12 × 8	ellipsoid with a pore
Agrocybe praecox	9 × 5.5	ellipsoid with a pore
Albatrellus ovinus	4 × 3.5	near spherical, amyloid
Aleuria aurantia	17.5 × 9	ellipsoid, reticulate, 2 drops inside
Aleurodiscus amorphus	28 × 23	near spherical, spiny
Amanita caesarea	10 × 7	broadly ellipsoid
Amanita citrina	9 × 8	near spherical, amyloid
Amanita crocea	10 ⊕	near spherical
Amanita fulva	11 ⊕	near spherical
Amanita gemmata	10 × 7.5	broadly ellipsoid
Amanita muscaria and *A. m.* var. *formosa*	9 × 6.5	ellipsoid
Amanita pantherina	11 × 7.5	broadly ellipsoid
Amanita phalloides	8.5 × 7	near spherical to broadly ellipsoid, amyloid
Amanita porphyria	9 ⊕	near spherical, amyloid
Amanita rubescens	8.5 × 6.5	broadly ellipsoid, amyloid
Amanita smithiana	12 × 7.5	ellipsoid, amyloid
Amanita spissa	9.5 × 7.5	near spherical, amyloid
Amanita vaginata	11 ⊕	near spherical
Amanita virosa	7.5 ⊕	near spherical, amyloid
Armillaria cepistipes	8.5 × 5.5	broadly ellipsoid
Armillaria mellea	8.5 × 5.5	broadly ellipsoid
Armillaria tabescens	8 × 6	broadly ellipsoid
Ascocoryne cylichnium	24 × 5	narrow ellipsoid, 5–7 septate
Ascocoryne sarcoides	14 × 4	narrow ellipsoid
Ascotremella faginea	8 × 4	ellipsoide, faintly striate
Asterophora parasitica	5.5 × 3.5	broadly ellipsoid
Astraeus hygrometricus	9 ⊕	spherical, spiny
Auricularia auricula-judae	14 × 5.5	sausage-shaped
Auricularia mesenterica	16.5 × 6	broadly sausage-shaped
Auriscalpium vulgare	5 × 4	oval, minutely spiny
Baeospora myosura	3.5 × 1.5	ellipsoid
Bankera fuligineoalba	5 × 3	oval, spiny
Bispora citrina	12 × 4	ellipsoid, 0–1 septate
Bjerkandera adusta	5 × 3	ellipsoid

SPECIES	SIZE (µm)	SHAPE
Boletus aereus	15.5 × 5.5	spindle-shaped
Boletus appendiculatus	14.5 × 4.5	spindle-shaped
Boletus badius	14 × 5	spindle-shaped
Boletus barrowsii	14 × 4.5	spindle-shaped
Boletus bicolor	10 × 4.5	near spindle-shaped
Boletus calopus	14 × 5.5	spindle-shaped
Boletus edulis	15.5 × 5.5	spindle-shaped
Boletus legaliae	13 × 6	spindle-shaped
Boletus luridiformis	15 × 5	spindle-shaped
Boletus luridus	13 × 6	near spindle-shaped
Boletus pascuus	13 × 5	spindle-shaped
Boletus parasiticus	15 × 5	spindle-shaped
Boletus pinophilus	17 × 5	spindle-shaped
Boletus porosporus	13 × 5	spindle-shaped, some have a pore and appear truncate
Boletus pulcherrimus	14.5 × 6	spindle-shaped
Boletus pulverulentus	13 × 5	spindle-shaped
Boletus reticulatus	15 × 5	spindle-shaped
Boletus rubellus	12.5 × 5	spindle-shaped
Boletus satanas	13 × 6	near spindle-shaped
Boletus subtomentosus	12.5 × 5	spindle-shaped
Bovista plumbea	5.5 × 5	near spherical with a long pedicel, warty
Bulgaria inquinans	12.5 × 6.5	kidney-shaped; in asci top 4 spores are brown, lower 4 (slightly smaller) are hyaline
Calocera viscosa	11.5 × 4	curved with rounded ends
Calocybe carnea	5.5 × 3	egg-shaped
Calocybe gambosa	5.5 × 3.5	egg-shaped
Calocybe ionides	6 × 3	egg-shaped
Calostoma cinnabarina	17 × 8	ellipsoid, pitted
Calvatia excipuliformis	5 ⊕	spherical, warty
Calvatia gigantea	4.5 ⊕	spherical, warty
Calvatia utriformis	4.5 ⊕	spherical, nearly smooth
Cantharellus cibarius	8.5 × 5	ellipsoid
Cantharellus cinnabarinus	9 × 5	ellipsoid
Cantharellus lateritius	10 × 5.5	ellipsoid
Cantharellus lutescens	10.5 × 7	broadly ellipsoid
Cantharellus subalbidus	8 × 5	ellipsoid
Cantharellus tubaeformis	10 × 8	ellipsoid
Chalciporus piperatus	9.5 × 4.5	oblong
Chlorociboria aeruginascens	7.5 × 2	spindle-shaped
Chlorophyllum molybdites	11 × 7.5	egg-shaped to ellipsoid with a pore
Chondrostereum purpureum	7.5 × 3	ellipsoid
Chroogomphus rutilus	19 × 6.5	spindle-shaped
Clathrus archeri	6.5 × 3	narrowly cylindrical
Clathrus ruber	5 × 2.5	ellipsoid to cylindrical
Clavaria vermicularis	7 × 4.5	oval
Clavariadelphus pistillaris	13.5 × 8	broadly ellipsoid
Clavulina cristata	9 × 7.5	broadly ellipsoid

SPECIES	SIZE (µm)	SHAPE
Clavulinopsis corniculata	6 ⊕	spherical
Clavulinopsis helvola	6.5 × 5	spherical to broadly ellipsoid, long warts, irregular outline
Clitocybe clavipes	8 × 4.5	ellipsoid
Clitocybe dealbata	5 × 3	tear-shaped
Clitocybe geotropa	8 × 6	tear-shaped
Clitocybe gibba	7 × 4.5	tear-shaped
Clitocybe metachroa	7 × 4.5	ellipsoid
Clitocybe nebularis	7.5 × 4	ellipsoid
Clitocybe odora	7 × 4.5	ellipsoid
Clitopilus prunulus	10.5 × 5	egg-shaped to ellipsoid, ribbed lengthwise
Collybia butyracea	7 × 3.5	oblong-ellipsoid
Collybia confluens	8 × 3.5	egg-shaped
Collybia dryophila	5.5 × 2.5	egg-shaped to ellipsoid
Collybia erythropus	7 × 3.5	ellipsoid
Collybia fusipes	5 × 3.5	broadly egg-shaped
Collybia maculata	5 × 4.5	near spherical
Collybia peronata	7.5 × 3.5	ellipsoid
Coltricia perennis	7 × 4.5	ellipsoid
Coniophora puteana	13 × 7	ellipsoid
Conocybe arrhenii	8 × 4.5	ellipsoid with a pore
Conocybe lactea	12.5 × 8	ellipsoid with a pore
Coprinus atramentarius	9 × 6	ellipsoid with a pore
Coprinus comatus	12 × 8	ellipsoid with a pore
Coprinus disseminatus	8.5 × 4.5	ellipsoid with a pore
Coprinus micaceus	8.5 × 6 × 4.5	flattened ellipsoid with a truncated pore
Coprinus niveus	15 × 10.5 × 8	flattened ellipsoid, slightly hexagonal, with a pore
Coprinus picaceus	16 × 11.5 × 9.5	flattened ellipsoid with a pore
Coprinus plicatilis	12 × 9 × 5	flat, heart-shaped with a pore
Cordyceps militaris	4.5 × 1.5	very long, cylindrical, breaking into part spores
Cordyceps ophioglossoides	4 × 2	very long, cylindrical, breaking into part spores
Cortinarius alboviolaceus	8.5 × 5.5	ellipsoid, rugose
Cortinarius anserinus	10 × 6.5	lemon-shaped, rugose
Cortinarius armillatus	10.5 × 6.5	almond-shaped, rugose
Cortinarius bolaris	6.5 × 4	near spherical, rugose
Cortinarius caerulescens	10 × 5.5	ellipsoid, rugose
Cortinarius calochrous	10 × 6	ellipsoid, rugose
Cortinarius cinnamomeus	7.5 × 4.5	almond-shaped, rugose
Cortinarius elegantissimus	14 × 8.5	lemon-shaped, rugose
Cortinarius mucosus	12.5 × 6.5	narrow lemon-shaped, rugose
Cortinarius orellanus	10.5 × 6	ellipsoid, rugose
Cortinarius paleaceus	8.5 × 5.5	ellipsoid, rugose
Cortinarius pholideus	7.5 × 5.5	near spherical, rugose
Cortinarius rubellus	10 × 7.5	near spherical to broadly ellipsoid, rugose
Cortinarius rufoolivaceus	13 × 7.5	almond- to lemon-shaped, rugose
Cortinarius semisanguineus	7 × 4.5	ellipsoid to lemon-shaped, rugose
Cortinarius sodagnitus	11 × 6	ellipsoid to almond-shaped, rugose
Cortinarius splendens	9.5 × 5.5	almond-shaped, rugose
Cortinarius torvus	9.5 × 6	broadly ellipsoid to egg-shaped, rugose
Cortinarius triumphans	12 × 6.5	almond-shaped, rugose

SPECIES	SIZE (µm)	SHAPE
Cortinarius violaceus	12.5 × 8	near spherical to almond-shaped, rugose
Craterellus cornucopioides	13 × 8	broadly ellipsoid
Creolophus cirrhatus	4 × 3	near spherical, amyloid, hyphae not amyloid
Crepidotus mollis	9 × 6	egg-shaped
Crepidotus variabilis	6.5 × 3	oblong-ellipsoid, warty
Crinipellus stipitaria	7.5 × 5	broadly ellipsoid
Crucibulum crucibuliforme	8 × 4.5	oblong-ellipsoid
Cyathus striatus	17 × 10	oblong-ellipsoid
Cystoderma amianthinum	6 × 3	egg-shaped, amyloid
Cystoderma carcharias	5 × 4	near spherical, amyloid
Cystoderma terrei	4.5 × 2.5	ellipsoid
Daedalea quercina	6.5 × 3	ellipsoid
Daedaleopsis confragosa	7.5 × 2.5	cylindrical, curved
Daldinia concentrica	14.5 × 7	ellipsoid to spindle-shaped, flattened on one side
Disciotis venosa	22 × 13.5	broadly ellipsoid
Dumontinia tuberosa	15 × 7.5	ellipsoid
Elaphomyces granulatus	30 ⊕	spherical, spiny
Entoloma abortivum	9 × 5	ellipsoid, angular
Entoloma cetratum	12 × 8	prism-shaped, nodular
Entoloma clypeatum	10 × 9.5	prism-shaped
Entoloma conferendum	10 × 9	cruciform, angular
Entoloma incanum	12.5 × 8.5	angular
Entoloma nitidum	8 × 7	angular
Entoloma porphyrophaeum	11 × 7.5	angular
Entoloma rhodopolium	8.5 × 7.5	prism-shaped
Entoloma sericeum	9 × 8	angular
Entoloma serrulatum	10.5 × 7.5	angular
Entoloma sinuatum	10 × 9	angular
Exidia glandulosa	13 × 4	sausage-shaped
Fistulina hepatica	5.5 × 4	near spherical
Flammulina velutipes	8.5 × 4	ellipsoid to cylindrical
Fomes fomentarius	17 × 6	cylindrical
Fomitopsis pinicola	7.5 × 4	slender ellipsoid
Galerina calyptrata	11 × 6	broadly spindle-shaped, warty, loosening outer wall
Galerina mutabilis	7.5 × 5	ellipsoid with a pore
Galerina unicolor	12 × 6	almond-shaped, rugose, loosening outer wall
Ganoderma applanatum	7.5 × 5	ellipsoid, truncated, warty
Ganoderma lucidum	10 × 7	ellipsoid, truncated, warty
Ganoderma pfeifferi	10 × 7.5	ellipsoid, truncated, warty
Geastrum fimbriatum	3.5 ⊕	spherical, warty
Geastrum schmidelii	5.2 ⊕	spherical, warty
Geastrum striatum	4.5 ⊕	spherical, warty
Geastrum triplex	4 ⊕	spherical, blunt spiny
Geoglossum fallax	75 × 6	near cylindrical, 0–7 septate
Geopora arenicola	25 × 15	ellipsoid, 1–2 drops inside
Gloeophyllum odoratum	8.5 × 4	cylindrical
Gomphidius glutinosus	19 × 5.5	near spindle-shaped
Gomphidius roseus	19 × 5.5	near spindle-shaped
Gomphus floccosus	13 × 7.5	ellipsoid, rugose
Grifola frondosa	5.5 × 4	broadly ellipsoid to near spherical
Gymnopilus penetrans	7.5 × 4.5	ellipsoid, rugose
Gymnopilus spectabilis	9 × 5.5	ellipsoid, rugose
Gyromitra esculenta	20 × 10	ellipsoid
Gyromitra infula	22 × 8.5	narrowly ellipsoid
Gyroporus castaneus	9.5 × 5.5	ellipsoid
Gyroporus cyanescens	10 × 5	ellipsoid

SPECIES	SIZE (µm)	SHAPE
Hapalopilus rutilans	5 × 2.5	ellipsoid
Hebeloma crustuliniforme	11 × 6	almond-shaped, rugose
Hebeloma mesophaeum	9 × 5.5	ellipsoid, finely rugose
Hebeloma radicosum	9 × 5.5	almond-shaped, rugose
Helvella crispa	20 × 12	ellipsoid
Helvella lacunosa	19 × 12	ellipsoid
Hericium coralloides	4 × 3	oval, amyloid
Heterobasidion annosum	4.5 × 3.5	broadly ellipsoid to near spherical, warty
Hydnellum peckii	5.5 × 4	oval, warty
Hydnum repandum	7 × 6	oval
Hydnum umbilicatum	8.5 × 7	near spherical
Hygrocybe calyptraeformis	7.5 × 5	broadly ellipsoid
Hygrocybe chlorophana	8.5 × 5	ovoid to ellipsoid
Hygrocybe coccinea	9 × 5	ellipsoid to almond-shaped
Hygrocybe conica (4-spored) (2-spored)	9.5 × 6 10.5 × 7	ellipsoid or almond- to bean-shaped
Hygrocybe miniata	7.5 × 5.5	often pear-shaped
Hygrocybe pratensis	6 × 4.5	near spherical to ellipsoid or tear-shaped
Hygrocybe psittacina	8.5 × 5.5	oblong-ellipsoid
Hygrocybe punicea	9.5 × 5	oblong-ellipsoid
Hygrocybe virginea	8 × 5	narrowly ellipsoid
Hygrophoropsis aurantiaca	6.5 × 4	oblong-ellipsoid
Hygrophorus eburneus	8.5 × 4.5	ellipsoid
Hygrophorus hypothejus	8 × 4.5	ellipsoid
Hymenochaete rubiginosa	5.5 × 3	oblong-ellipsoid
Hypholoma capnoides	8 × 4.5	ellipsoid with a pore
Hypholoma fasciculare	7 × 4.5	ellipsoid with a pore
Hypholoma sublateritium	7 × 4	ellipsoid with a pore
Hypomyces hyalinus	19 × 5.5	spindle-shaped, 2-celled, warty
Hypomyces lactifluorum	40 × 4.5	spindle-shaped, 2-celled, warty
Hypoxylon fragiforme	13 × 6	ellipsoid to spindle-shaped, flattened
Inocybe asterospora	10.5 × 8.5	star-shaped, nodular
Inocybe erubescens	12 × 6	ellipsoid to bean-shaped
Inocybe geophylla	9.5 × 5.5	ellipsoid
Inocybe godeyi	10.5 × 6.5	almond-shaped
Inocybe griseolilacina	9 × 5.5	almond-shaped
Inocybe haemacta	9 × 5.5	ellipsoid to almond-shaped
Inocybe lacera	14 × 5.5	cylindrical
Inocybe rimosa	12 × 6	ellipsoid to bean-shaped
Inonotus hispidus	8.5 × 7	broadly ellipsoid
Inonotus radiatus	6 × 4.5	broadly ellipsoid
Laccaria amethystina	9.5 ⊕	spherical or near spherical, spiny
Laccaria laccata	9 × 8	spherical or near spherical, spiny
Lactarius blennius	7.5 × 6	near spherical, warty, veined, amyloid
Lactarius camphoratus	8 × 7	near spherical, spiny-rugose, veined, amyloid
Lactarius controversus	7 × 5	near spherical, rugose, veined, amyloid
Lactarius deliciosus	8.5 × 7	near spherical, warty, veined, amyloid
Lactarius deterrimus	9 × 7	near spherical, warty, veined, amyloid
Lactarius fuliginosus	9 ⊕	spherical, reticulate, crested, amyloid

SPECIES	SIZE (µm)	SHAPE
Lactarius glyciosmus	8.5 × 7.5	near spherical, rugose, veined, amyloid
Lactarius helvus	8 × 6	near spherical, reticulate, veined, amyloid
Lactarius hepaticus	8 × 6.5	near spherical, reticulate, veined, amyloid
Lactarius hygrophoroides	8.5 × 7	near spherical, warty, veined, amyloid
Lactarius mitissimus	9 × 7	near spherical, rugose, amyloid
Lactarius necator	7 × 6	near spherical, veined, amyloid
Lactarius pallidus	8 × 6.5	near spherical, rugose, veined, amyloid
Lactarius piperatus	8.5 × 6.5	near spherical, warty, with connecting lines, amyloid
Lactarius pyrogalus	7 × 5.5	near spherical, reticulate, veined, amyloid
Lactarius quietus	8.5 × 7.5	near spherical, rugose, veined, amyloid
Lactarius rufus	9 × 6.5	broadly ellipsoid, reticulate, veined, amyloid
Lactarius sanguifluus	8.5 × 7	near spherical, warty, veined
Lactarius subdulcis	7.5 × 6	near spherical, reticulate, veined, amyloid
Lactarius theiogalus	8.5 × 6.5	near spherical, rugose, veined, amyloid
Lactarius torminosus	8.5 × 7	near spherical, rugose, veined, amyloid
Lactarius trivialis	9.5 × 8	near spherical, rugose, veined, amyloid
Lactarius vellereus	10.5 × 8.5	near spherical, warty, with connecting veins, amyloid
Lactarius volemus	8.5 ⊕	spherical, reticulate, veined, amyloid
Laetiporus sulphureus	6 × 4	broadly ellipsoid
Leccinum crocipodium	15 × 6	near spindle-shaped
Leccinum quercinum	13.5 × 4.5	near spindle-shaped
Leccinum scabrum	17 × 5.5	near spindle-shaped
Leccinum variicolor	14.5 × 5	near spindle-shaped
Leccinum versipelle	14.5 × 4.5	near spindle-shaped
Lentinellus cochleatus	4.5 × 4	near spherical, spiny
Lentinellus ursinus	4 × 2.5	egg-shaped, spiny, amyloid
Lentinus tigrinus	7.5 × 3.5	cylindrical
Lenzites betulina	5.5 × 2.5	more or less ellipsoid
Leotia lubrica	23 × 6	near cylindrical, somewhat curved, 4–5 septate
Lepiota aspera	8 × 3	ellipsoid
Lepiota brunneoincarnata	8 × 4.5	egg-shaped
Lepiota castanea	11 × 4	projectile-shaped
Lepiota clypeolaria	14 × 6	spindle-shaped
Lepiota cristata	7 × 3.5	projectile-shaped
Lepiota ignivolvata	12 × 6	broadly spindle-shaped
Lepiota oreadiformis	12.5 × 5	spindle-shaped
Lepista flaccida	3-4.5 ⊕	near spherical, fine spiny
Lepista irina	8 × 4.5	ellipsoid, rugose
Lepista nuda	7.5 × 4.5	ellipsoid, rugose
Lepista personata	7.5 × 5	ellipsoid, rugose
Leucoagaricus leucothites	8.5 × 5.5	broadly egg- to almond-shaped
Leucocoprinus badhamii	6.5 × 4.5	ellipsoid to spindle-shaped
Leucocoprinus luteus	8.5 × 6	almond-shaped with a pore

Species	Size (µm)	Shape
Leucopaxillus giganteus	7 × 4	tear-shaped
Limacella guttata	5.5 × 4.5	near spherical
Lycoperdon echinatum	4.5 ⊕	spherical, warty
Lycoperdon perlatum	3.5 ⊕	spherical, warty
Lycoperdon pyriforme	4 ⊕	spherical, nearly smooth
Lyophyllum connatum	6 × 3.5	ellipsoid
Lyophyllum decastes	5.5 ⊕	spherical
Lyophyllum palustre	7 × 4	ellipsoid
Macrocystidia cucumis	9 × 4.5	ellipsoid
Macrolepiota procera	15 × 10	ellipsoid with a pore
Macrolepiota rhacodes	10 × 6.5	ellipsoid with a pore
Macrotyphula fistulosa	13 × 6.5	ellipsoid
Marasmiellus ramealis	9 × 3	spindle-shaped to ellipsoid
Marasmius alliaceus	9.5 × 7	broadly ellipsoid
Marasmius androsaceus	8 × 4.5	ellipsoid to tear-shaped
Marasmius oreades	9 × 5.5	broadly ellipsoid
Marasmius rotula	8 × 4	ellipsoid or tear-shaped
Megacollybia platyphylla	7.5 × 6.5	near spherical
Melanoleuca cognata	9.5 × 6	ellipsoid, fine spiny, amyloid
Melanoleuca polioleuca	8 × 5.5	ellipsoid, fine spiny, amyloid
Meripilus giganteus	6 × 5	broadly ellipsoid to near spherical
Micromphale foetidum	9 × 4	ellipsoid
Mitrula paludosa	12.5 × 3	club-shaped to cylindrical
Morchella elata	25 × 14	ellipsoid
Morchella esculenta	20 × 12.5	ellipsoid
Morchella semilibera	26 × 16	ellipsoid
Mutinus caninus	5.5 × 2.5	ellipsoid
Mycena acicula	11 × 3.5	near spindle-shaped to near cylindrical
Mycena adonis	8.5 × 5	ellipsoid to oblong
Mycena arcangeliana	9 × 5.5	ellipsoid
Mycena crocata	8.5 × 5	broadly ellipsoid
Mycena epipterygia	10 × 5	ellispoid
Mycena filopes	10 × 6	ellipsoid
Mycena flavoalba	7.5 × 3.5	ellipsoid to near cylindrical
Mycena galericulata	10 × 7.5	egg-shaped to oblong
Mycena galopus	12 × 6	ellipsoid to near cylindrical
Mycena haematopus	8.5 × 6	ellipsoid
Mycena inclinata	10 × 6.5	egg-shaped to ellipsoid
Mycena leptocephala	10 × 5	ellipsoid to near cylindrical
Mycena olivaceomarginata	10 × 5.5	ellipsoid
Mycena pelianthina	6.5 × 3.5	ellipsoid
Mycena polygramma	9.5 × 6.5	ellipsoid
Mycena pura	7 × 3.5	ellipsoid
Neobulgaria pura	9 × 4	ellipsoid, striped lengthways
Oligoporus rennyi	4 × 2.5	oblong
Omphalina umbellifera	8.5 × 6	near spherical to egg-shaped
Omphalotus olearius	5.5 × 5	near spherical
Otidea onotica	13 × 7	ellipsoid, 2 drops inside
Oudemansiella mucida	16 × 14	near spherical to spherical, thick-walled
Oudemansiella radicata	13.5 × 10	broadly ellipsoid
Paecilomyces farinosus	2.5 × 1.5	ellipsoid
Panaeolina foenisecii	13.5 × 8	lemon-shaped with a pore, warty
Panaeolus papilionaceus	16 × 9	lemon-shaped with a pore
Panaeolus semiovatus	18 × 10	broadly ellipsoid with a pore
Panellus serotinus	5 × 1.5	sausage-shaped
Panellus stypticus	4.5 × 2	egg-shaped
Paxillus atrotomentosus	5 × 4	broadly ellipsoid
Paxillus corrugatus	3 × 1.75	ellipsoid
Paxillus involutus	9 × 5.5	ellipsoid
Peziza badia	18.5 × 8.5	ellipsoid, 2 drops inside
Peziza succosa	20.5 × 11	ellipsoid, 2 drops inside, warty
Peziza vesiculosa	22 × 12	ellipsoid without drops
Phaeolepiota aurea	12 × 5	narrowly ellipsoid
Phaeolus schweinitzii	7 × 4	ellipsoid
Phallus duplicatus	4 × 2	ellipsoid
Phallus impudicus	5 × 2.5	ellipsoid
Phellinus igniarius	6 × 5	near spherical
Phellodon niger	4 × 3	oval, spiny
Phellodon tomentosus	4 × 3	oval or spherical, spiny
Phlebia tremellosa	4 × 1	sausage-shaped
Pholiota alnicola	9.5 × 5	ellipsoid with a pore
Pholiota aurivellus	9 × 5.5	ellipsoid with a pore
Pholiota gummosa	7.5 × 4	ellipsoid with a pore
Pholiota highlandensis	7 × 4.5	ellipsoid with a pore
Pholiota lenta	6.5 × 3.5	ellipsoid with a pore
Pholiota squarrosa	7 × 4	ellipsoid with a pore
Phylloporus rhodoxanthus	12.5 × 4.5	ellipsoid to spindle-shaped
Piptoporus betulinus	6 × 2	sausage-shaped
Pleurocybella porrigens	7 × 5	near spherical to broadly ellipsoid
Pleurotus cornucopiae	10 × 4.5	elongated ellipsoid
Pleurotus eryngii	11 × 5	elongated ellipsoid
Pleurotus ostreatus	9.5 × 3.5	elongated ellipsoid
Pluteus aurantiorugosus	6 × 4	broadly ellipsoid
Pluteus cervinus	7.5 × 5.5	broadly ellipsoid
Pluteus chrysophaeus	7 × 6	near spherical
Pluteus umbrosus	6.5 × 5	broadly ellipsoid
Polyporus badius	7.5 × 3.5	cylindrical
Polyporus brumalis	5.5 × 2.5	cylindrical
Polyporus squamosus	13 × 5	cylindrical
Polyporus tuberaster	13 × 5	cylindrical
Polyporus umbellatus	9 × 3	cylindrical
Polyporus varius	8.5 × 3	cylindrical
Porphyrellus porphyrosporus	14 × 6	near spindle-shaped
Postia caesia	5 × 1.5	sausage-shaped, amyloid
Postia stiptica	4.5 × 2	ellipsoid to cylindrical
Psathyrella candolleana	8 × 4.5	ellipsoid with a pore
Psathyrella conopilus	15.5 × 7.5	ellipsoid with a pore
Psathyrella multipedata	7.5 × 4	ellipsoid with a pore
Psathyrella piluliformis	6 × 3.5	ellipsoid with a pore
Psathyrella velutina	9.5 × 6	lemon-shaped with a big pore, warty
Pseudoclitocybe cyathiformis	9 × 5.5	ellipsoid, amyloid
Pseudohydnum gelatinosum	6.5 × 5.5	near spherical to broadly ellipsoid
Psilocybe cubensis	14 × 9	ellipsoid with a pore
Psilocybe cyanescens	11.5 × 7 × 6	ellipsoid to almond-shaped with a pore
Psilocybe semilanceata	13 × 8	ovoid to ellipsoid with a pore
Psilocybe squamosa	14 × 8	ellipsoid with a pore
Pycnoporus cinnabarinus	5 × 2.5	ellipsoid
Ramaria abietina	8 × 4	ellipsoid, short spiny
Ramaria botrytis	15 × 5.5	narrowly ellipsoid, striped
Ramaria sanguinea	10 × 4.5	narrowly ellipsoid, warty
Ramaria stricta	9 × 4.5	ellipsoid, warty
Rickenella fibula	4.5 × 2.5	narrowly ellipsoid
Rickenella setipes	5 × 3	ellipsoid
Rozites caperata	12.5 × 8	almond-shaped, rugose

SPECIES	SIZE (µm)	SHAPE
Russula aeruginea	8 × 6	near spherical, warty, veined, amyloid
Russula atropurpurea	8 × 6.5	near spherical, warty, partially reticulate, amyloid
Russula claroflava	8.5 × 7	near spherical, warty, veined, amyloid
Russula cyanoxantha	8.5 × 7	near spherical, warty, veined, amyloid
Russula delica	9.5 × 7.5	near spherical, rugose, amyloid
Russula emetica	9.5 × 8	near spherical, warty, veined, amyloid
Russula fellea	8.5 × 6.5	near spherical, veined, amyloid
Russula foetens	8.5 × 8	near spherical, warty, amyloid
Russula fragilis	8.5 × 7	near spherical, reticulate, warty, amyloid
Russula integra	10.5 × 8.5	near spherical, spiny, amyloid
Russula mairei	7.5 × 6	near spherical, reticulate, warty, amyloid
Russula nigricans	7 × 6.5	near spherical, reticulate, amyloid
Russula ochroleuca	9 × 7.5	near spherical, partly reticulate, warty, amyloid
Russula paludosa	9.5 × 8	near spherical, warty, some connecting veins, amyloid
Russula puellaris	8 × 6	near spherical, warty-spiny, amyloid
Russula rosea	8.5 × 7.5	near spherical, reticulate, warty, amyloid
Russula sanguinaria	8.5 × 7.5	near spherical, spiny, some connecting veins, amyloid
Russula sardonia	8 × 6.5	near spherical, warty-crested, veined, amyloid
Russula turci	8 × 7	near spherical, warty-crested, veined, amyloid
Russula vesca	7 × 5.5	near spherical, warty, amyloid
Russula vinosa	10 × 8	near spherical, spiny, amyloid
Russula virescens	8 × 6.5	near spherical, reticulate, warty, amyloid
Russula xerampelina	9 × 8	near spherical, warty, amyloid
Rutstroemia firma	17 × 5.5	narrow ellipsoid, 3–5 septate
Sarcodon imbricatum	7.5 × 5	near spherical, warty
Sarcodon scabrosus	7.5 × 6	spherical with coarse warts
Sarcoscypha austriaca	28 × 13	narrowly ellipsoid
Schizophyllum commune	5 × 2	cylindrical or curved
Schizopora paradoxa	5.5 × 3.5	oval
Scleroderma citrinum	11.5 ⊕	spherical, spiny, partially reticulate
Scleroderma verrucosum	10 ⊕	spherical, spiny
Scutellinia scutellata	19 × 12	ellipsoid, warty
Sepedonium chrysospermum	20 ⊕	spherical, warty
Serpula lacrymans	12 × 7	ellipsoid
Sparassis crispa	7 × 4.5	ellipsoid
Spinellus fusiger	40 × 20	lemon-shaped, variable
Stereopsis humphreyi	7.5 × 4.5	ellipsoid to egg-shaped
Stereum hirsutum	6 × 2.5	ellipsoid to cylindrical, amyloid
Stereum rugosum	7.5 × 4	ellipsoid to cylindrical, amyloid
Stereum subtomentosum	6 × 2.5	ellipsoid to cylindrical, amyloid

SPECIES	SIZE (µm)	SHAPE
Strobilomyces strobilaceus	11 × 10	near spherical, reticulate
Strobilurus esculentus	5 × 2	ellipsoid
Stropharia aurantiaca	14 × 7	ellipsoid with a pore
Stropharia coronilla	8.5 × 4.5	ellipsoid with a pore
Stropharia cyanea	8.5 × 4.5	ellipsoid with a pore
Stropharia rugoso-annulata	11.5 × 8	ellipsoid with a pore
Stropharia semiglobata	18 × 9	ellispoid with a pore
Suillus aeruginascens	11.5 × 5	near spindle-shaped
Suillus bovinus	9 × 3.5	near spindle-shaped
Suillus granulatus	9 × 3	near spindle-shaped
Suillus grevillei	9.5 × 3.5	near spindle-shaped
Suillus luteus	8.5 × 3.5	oblong to spindle-shaped
Suillus plorans	9 × 4.5	ellipsoid
Suillus spraguei	10 × 4	ellipsoid
Suillus variegatus	9 × 3.5	near spindle-shaped
Syzygites megalocarpus	25	globose
Tarzetta cupularis	20 × 13	narrowly ellipsoid, 2 drops inside
Thelephora terrestris	9 × 7	oval to ellipsoid, warty-spiny
Trametes gibbosa	5 × 2.5	cylindrical to curved
Trametes hirsuta	6 × 2	cylindrical
Trametes versicolor	6.5 × 2	cylindrical
Tremella foliacea	9.5 × 8	oval
Tremella mesenterica	12.5 × 8.5	oval
Trichaptum abietinum	7.5 × 2.5	cylindrical
Trichoglossum hirsutum	125 × 7	near cylindrical, pointed ends, 15 septate
Tricholoma atrosquamosum	6.5 × 4	ellipsoid
Tricholoma auratum	5.5 × 3.5	ellipsoid
Tricholoma caligatum	7 × 5	ellipsoid
Tricholoma flavovirens	7 × 4.5	ellipsoid
Tricholoma fulvum	6.5 × 4.5	broadly ellipsoid
Tricholoma lascivum	7 × 4	ellipsoid to near spindle-shaped
Tricholoma magnivelare	6 × 5	ellipsoid to near spherical
Tricholoma pardinum	10 × 6.5	broadly ellipsoid
Tricholoma portentosum	6.5 × 4.5	ellipsoid
Tricholoma saponaceum	6 × 4	ellipsoid
Tricholoma scalpturatum	5 × 3	ellipsoid
Tricholoma sciodes	7 × 6	broadly ellipsoid
Tricholoma sejunctum	5.5 × 4	ellipsoid
Tricholoma sulphureum	10 × 6	ellipsoid to almond-shaped
Tricholoma terreum	6.5 × 4.5	ellipsoid
Tricholoma ustale	7 × 5	ellipsoid
Tricholomopsis rutilans	6.5 × 5	broadly ellipsoid to near spherical
Tuber aestivum	30 × 24	egg-shaped, reticulate, spiny
Tuber canaliculatum	60 × 50	ellipsoid to near spherical, reticulate
Tuber magnatum	40 × 35	egg-shaped, reticulate
Tuber melanosporum	35 × 25	ellipsoid, curved spiny
Tylopilus felleus	13 × 4.5	near spindle-shaped
Typhula erythropus	6 × 3	ellipsoid
Vascellum pratense	3.5 ⊕	spherical, warty
Verpa conica	22 × 13	ellipsoid
Volvariella bombycina	9 × 6	ellipsoid
Volvariella gloiocephala	15 × 9	egg-shaped to ellipsoid
Xylaria hypoxylon	12.5 × 5.5	spindle-shaped, flattened
Xylaria polymorpha	25 × 7	spindle-shaped, flattened
Zelleromyces cinnabarinus	15 x 12	ellipsoid, reticulate, amyloid

GLOSSARY

Many of the terms described here are illustrated in the introduction (pp.6–23). Words in **bold** type are defined elsewhere in the glossary.

• ADNATE GILLS
Gills that are broadly attached to the stem.

• ADNEXED GILLS
Gills with a narrow attachment to the stem.

• AGARIC
Fungus with a cap and stem **fruitbody** with **gills** under the cap.

• AMYLOID
Refers to a reaction with an iodine reagent resulting in a blue stain.

• ASCUS (*pl.* ASCI)
The saclike organ in which ascomycetes (see p.11) produce sexual **spores**.

• BASIDIUM (*pl.* BASIDIA)
The club-shaped organ on which basidiomycetes (see p.11) form sexual **spores**.

• BOLETE
A bolete produces a fleshy cap and stem **fruitbody** with **pores** and soft **tubes** under the cap.

• BOREAL
Refers to northern conifer region.

• CORTINA
A weblike **veil**, found in the genus *Cortinarius*.

• CYSTIDIUM (*pl.* CYSTIDIA)
Special sterile cells that can be found in various places on **fruitbodies** of basidiomycetes (see p.8). Cystidia on the **gill** sides and the stem can be important in identifying species of *Conocybe* and *Inocybe*.

• DECURRENT GILLS
Gills that run down the stem.

• DELIQUESCENT GILLS
Gills that dissolve as they mature, releasing an inky liquid full of black **spores**. They are peculiar to the genus *Coprinus*.

• FIBRILLOSE
With threadlike fibers.

• FIMBRIATE
With prominent projecting hairs on the cap margin.

• FLASK FUNGUS
Fungus with tiny, flask-shaped **fruitbodies**, sometimes enclosed within a protective **stroma**.

• FREE GILLS
Gills with no stem attachment.

• FRUITBODY
A structure that supports the cells required for sexual reproduction in fungi.

• GILLS
The bladelike, **spore**-bearing structures found under the caps of **agarics**.

• GLEBA
The fertile tissue occuring in the group of fungi that includes puffballs, stinkhorns, earth stars, earth balls, and bird's nest fungi.

• HYALINE
Colorless.

• HYGROPHANOUS
Usually refers to the caps of **agarics** drying from the center and becoming paler in zones until they are completely dry. When damp, the dark color reappears from the margin inward. Such fungi are typically **striate** at the cap margin.

• HYPHA (*pl.* HYPHAE)
The threadlike structures that make up a fungus, including its **fruitbodies**.

• KOH
Potassium hydroxide. This aids identification by producing stains on the flesh of certain fungi.

• MYCORRHIZAL
A relationship between plants and fungi that benefits both partners.

• NOTCHED GILLS
Gills that are indented just before reaching the stem.

• OSTIOLE
The opening or neck of the **spore**-producing organ in **flask fungi**.

• PARTIAL VEIL
Thin, skin- or threadlike tissue that protects the **gills** or **pores** of the immature **fruitbody**. It splits as the fruitbody matures, often leaving traces at the cap margin or as a ring around the stem.

• PEDICEL
A cylindrical or tapering appendage on the **spores** of some fungi, such as *Bovista plumbea*.

• PORES
The opening of the **tubes** through which the **spores** are released in fungi such as **boletes**.

• RESUPINATE
Refers to a **fruitbody** that grows completely flat against the **substrate** without producing a cap or free margin.

• RETICULATE
With a net pattern.

• RHIZOIDS
Tightly spun **hyphae**.

• RUGOSE
With a rough surface.

• SCLEROTIUM (*pl.* SCLEROTIA)
A storage organ with a dense pale interior and a black protective rind produced by some fungi. It contains nutrients that will enable the fungus to grow when conditions are favorable.

• SEPTATE
Refers to **hyphae** or **spores** with transverse partitions or walls.

• SETA (*pl.* SETAE)
Thick-walled hairs (on caps, **gills**, stems, or in the flesh).

• SINUATE GILLS
Curved **gills**.

• SPORES
Microscopic cells produced by fungi for reproduction.

• STRIATE
Refers to lines on the cap caused by underlying **gills**.

• STROMA (*pl.* STROMATA)
A protective tissue, formed by **flask fungi** for example; it normally contains the tiny **fruitbodies**.

• SUBSTRATE
The medium, such as soil or bark, in which a fungus grows.

• TUBES
Tubular structures under the caps of fungi such as **boletes**, where the fertile, **spore**-producing tissue is found. Tubes are visible as **pores** on the undersurface.

• UMBO
A raised boss in the center of a cap.

• UNIVERSAL VEIL
Thin skin- or weblike tissue covering the whole of the immature **fruitbody**. It splits as the fruitbody grows, sometimes leaving a **volva** at the stem base or loose scales on the cap.

• VEIL
Thin skin- or weblike tissue that may protect entire **fruitbodies** (**universal veil**) or just the **gills** or **pores** (**partial veil**).

• VISCID
Slimy-sticky.

• VOLVA
A saclike remnant of the **universal veil** at a stem base.

INDEX

A

Aborted Entoloma 253
Agaric, Lichen 36
Agaric, Orange Moss 36
Agaric, Stout-stalked 148
Agaricaceae 17, 21, 156–70
agarics 18
Agaricus arvensis 23, 157
Agaricus augustus 158
Agaricus bernardii 162
Agaricus bisporus 7, 161
Agaricus bitorquis 161
Agaricus californicus 159
Agaricus campestris 21, 160
Agaricus, Cultivated 161
Agaricus hondensis 159
Agaricus, Horse 157
Agaricus langei 163
Agaricus macrosporus 157
Agaricus, Meadow 160
Agaricus phaeolepidotus 160, 163
Agaricus placomyces 160
Agaricus porphyrizon 163
Agaricus praeclaresquamosus 159, 160
Agaricus, Prince 158
Agaricus, Purplish Yellow 163
Agaricus, Red-staining 163
Agaricus, Salt-loving 162
Agaricus, Spring 161
Agaricus sylvaticus 163
Agaricus sylvicola 156
Agaricus, Toxic Scaly 160
Agaricus, Toxic Yellowing 159
Agaricus, Woods 156
Agaricus xanthoderma 23, 159
Agrocybe arvalis 106
Agrocybe, Common Lawn 106
Agrocybe cylindracea 85
Agrocybe dura 106
Agrocybe pediades 106
Agrocybe, Poplar 85
Agrocybe praecox 85
Agrocybe, Spring Wood-chip 85
Albatrellaceae 202
Albatrellus confluens 202
Albatrellus ovinus 202
Albatrellus subrubescens 202
Alcohol Funnel Cap 40
Alcohol Inky Cap 175
Alder Bracket Polypore 221
Alder Pholiota 91
Aleuria aurantia 268
Aleurodiscaceae 273
Aleurodiscus amorphus 273
Amanita, Blushing 147
Amanita caesarea 145
Amanita, Caesar's 145
Amanitaceae 145–53
Amanita citrina 150
Amanita, Citron 150
Amanita crocea 153
Amanita, Death Cap 151
Amanita excelsa 148
Amanita, Fly 6, 146
Amanita fulva 10, 152
Amanita gemmata 149
Amanita, Gemmed 149
Amanita muscaria 6, 18, 146
Amanita ovoidea 150
Amanita, Panther 149
Amanita pantherina 23, 149
Amanita phalloides 8, 23, 151
Amanita porphyria 151
Amanita, Purple-brown 151
Amanita rubescens 23, 147
Amanita smithiana 148
Amanita spissa 10, 148
Amanita, Stout-stalked 148
Amanita, Toxic Lepidella 148
Amanita vaginata 153
Amanita verna 150
Amanita virosa 8, 23, 150
Anemone Cup 270
Angel's Wings Oyster 180
Anise Funnel Cap 39
Anise-scented Polypore 222
Antler Jelly 250
Armed Stinkhorn 277
Armillaria cepistipes 19, 80
Armillaria gallica 80
Armillaria mellea 19, 80
Armillaria ostoyae 80
Armillaria tabescens 19, 42
Artist's Polypore 217
Asco, Beech Cushion 257
Asco, Carbon Antler 248
Ascocoryne cylichnium 272
Ascocoryne sarcoides 272
Ascocoryne turficola 272
Asco, Cotton Caterpillar 244
Asco, Cramp Balls 257
Asco, Dead-man's Fingers 245
Asco, Jelly Babies 243
Asco, Orange Caterpillar 244
Asco, Scaly Earth-tongue 242
Ascotremella faginea 283
Asco, Truffe Caterpillar 245
Aseroë coccinea 277
Asterophora lycoperdoides 142
Asterophora parasitica 142
Astraeus hygrometricus 278
Auricularia auricula-judae 281
Auriculariaceae 230, 281
Auricularia mesenterica 230
Auricularia polytricha 281
Auriscalpiaceae 179, 234
Auriscalpium vulgare 234

B

Baeospora myosura 132
Baeospora myriadophylla 132
Bankeraceae 235–37
Bankera fuligineoalba 235
Bankera violascens 235
Bare-toothed Russula 125
Barometer Earth Star 278
Barrow's Bolete 186
Bay Bolete 188
Beech Cushion Asco 257
Beech Jelly-drop Cup 271
Beech Woods Entoloma 68
Beefsteak Polypore 213
Big Laughing Gym 83
Birch Polypore 212
Birch Trich 64
Bird's Nest, Fluted 274
Bird's Nest, White-egg 274
Bisporella citrina 273
Bitter Bolete 186
Bitter Coral 251
Bitter Lilac Cort 76
Bitter Polypore 211

Bitter Woolly-foot Collybia 113
Bjerkandera adusta 225
Bjerkanderaceae 213, 214, 216, 225
Bjerkandera fumosa 225
Black Brain Jelly 283
Blackening Russula 122
Blackening Wax Cap 104
Black Jelly-drop Cups 271
Black Morel 210
Black-staining Polypore 214
Black Tooth 236
Black Trumpet 275
Bladder Cup 266
Bleeding Mycena 136
Blewit, Pungent False 57
Blewit, True 57
Blood-red Russula 130
Bloody Tooth 237
Blue-cap, Saw-gilled Entoloma 144
Blue-footed Scaly Tooth 237
Blue-green Psilocybe 88
Blueing Chambered Bolete 195
Blueing Chocolate Bolete 184
Blue-stalked Blewit 58
Blushing Amanita 147
Blushing Fragrant Tooth 235
Bog Beacon Asco 243
Bog Galerina, Tiny 140
Bog Lyophyllum 132
Bolbitiaceae 85, 96, 106, 140
Bolbitius lacteus 140
Boletaceae 42, 185–98
Bolete, Barrow's 186
Bolete, Bay 188
Bolete, Bitter 186
Bolete, Blueing Chambered 195
Bolete, Blueing Chocolate 184
Bolete, Brown Scaber-stalk 196
Bolete, Chestnut 194
Bolete, Dotted-stalk 200
Bolete, Dotted-stem 189
Bolete, Earth-ball 194
Bolete, Euro Cow 200
Bolete, Gilled 42
Bolete, King 187
Bolete, Larch 199
Bolete, Le Gal's 191
Bolete, Midnight Blue 192
Bolete, Orange Scaber-stalk 197
Bolete, Painted 201
Bolete, Peppery 185
Bolete, Pretty Poison 191
Bolete, Red-capped 193
Bolete, Red-cracking 192
boletes 7, 20, 184
Bolete, Satan's 191
Bolete, Scarlet-stemmed 190
Bolete, Slippery Jack 198
Bolete, Spindle-stemmed 188
Bolete, Summer 189
Bolete, Variegated 201
Bolete, Yellow-cracking 193
Boletus aereus 189
Boletus appendiculatus 188
Boletus badius 188
Boletus barrowsii 186
Boletus bicolor 190
Boletus calopus 190
Boletus chrysenteron 192
Boletus edulis 187
Boletus erythropus 189
Boletus ferrugineus 193
Boletus junquilleus 189
Boletus legaliae 191
Boletus luridiformis 189, 192
Boletus luridus 189, 190
Boletus parasiticus 194
Boletus pinophilus 187
Boletus porosporus 192
Boletus pruinatus 192, 193
Boletus pulcherrimus 191
Boletus pulverulentus 192
Boletus queletii 189
Boletus radicans 188
Boletus reticulatus 189
Boletus rhodoxanthus 191
Boletus rubellus 193
Boletus satanas 191
Boletus sensibilis 193
Boletus subtomentosus 193
Bonnet, Euro Field 134
Bovista nigrescens 255
Bovista plumbea 255
Bracket Jelly 230
Bread Dough Clitopilus 41
Brick Cap Psilocybe 87
Broad-gilled Collybia 66
Brown Leafy Jelly 282
Brown Matsutake 81
Brown Oak Cup 270
Brown Scaber-stalk Bolete 196
Bryoglossum rehmii 243
Buff Wax Cap 38
Bulgaria inquinans 271
Burgundy Caps 89
Burnt-rubber Lepiota 169
Burnt Trich 62
Buttery Collybia 112

C

Caesar's Amanita 145
Caged Stinkhorn 280
Calocera cornea 250
Calocera furcata 250
Calocera pallido-spathulata 250
Calocera viscosa 250
Calocybe carnea 116
Calocybe gambosa 58
Calocybe ionides 116
Calocybe obscurissima 116
Calocybe persicolor 116
Calostoma cinnabarina 263
Calostoma lutescens 263
Calostoma ravenelii 263
Calostomataceae 263
Calvatia excipuliformis 262
Calvatia gigantea 254
Calvatia utriformis 263
Cantharellaceae 28–30, 275
Cantharellus cibarius 8, 28, 276
Cantharellus cinnabarinus 30
Cantharellus cornucopioides 275
Cantharellus lateritius 276
Cantharellus lutescens 275
Cantharellus odoratus 276

Cantharellus subalbidus 28
Cantharellus tubaeformis 30, 275
Carbon Antler Asco 248
Cauliflower Mushroom 252
Cerrena unicolor 224
Chaetoporellaceae 232
Chalciporus amarellus 185
Chalciporus piperatus 185
Chalciporus rubinus 185
Chanterelle, Cinnabar 30
Chanterelle, Common 28
Chanterelle, False 29
Chanterelle, Golden 275
chanterelles 7
Chanterelle, Scaly Vase 276
Chanterelle, Smooth 276
Chanterelle, Trumpet 30
Charcoal Pholiota 93
Chestnut Bolete 194
Chestnut Parasol 169
Chicken-of-the-Woods 215
Chlorine Lawn Mycena 135
Chlorociboria aeruginascens 269
Chlorociboria aeruginosa 269
Chlorophyllum molybdites 17, 166
Chondrostereum purpureum 231
Chroogomphus rutilus 37
Ciboria batschiana 270
Cinnabar Chanterelle 30
Cinnabar Cystoderma 96
Cinnabar Polypore 225
Citron Amanita 150
Clathraceae 277
Clathrus archeri 277
Clathrus ruber 280
Clavaria angillacea 240
Clavariaceae 21, 240, 249
Clavariadelphaceae 241
Clavariadelphus ligula 241
Clavariadelphus pistillaris 241
Clavariadelphus sachalinensis 241
Clavariadelphus truncatus 241
Clavaria vermicularis 240
Clavicipitaceae 244, 245
Clavulinaceae 249
Clavulina cristata 249
Clavulina rugosa 249
Clavulinopsis corniculata 249
Clavulinopsis fusiformis 240
Clavulinopsis helvola 240
Clavulinopsis laeticolor 240
Clavulinopsis luteoalba 240
Climacodon septentrionalis 239
Clitocybe clavipes 40
Clitocybe dealbata 34
Clitocybe fragrans 39
Clitocybe geotropa 33
Clitocybe gibba 31
Clitocybe metachroa 34
Clitocybe nebularis 40
Clitocybe odora 39
Clitocybe vibecina 34
Clitopilus, Bread Dough 41
Clitopilus prunulus 41
Clouded Funnel Cap 40
Clustered Oak-Mycena 133
Cockleshell Lentinellus 179
Coconut-scented Lactarius 54
Collared Earth Star 278
Collybia acervata 112, 113
Collybia alcalivirens 113
Collybia aquosa 111
Collybia, Bitter Woolly-foot 113
Collybia, Broad-gilled 66
Collybia, Buttery 112
Collybia butyracea 112
Collybia, Common 111
Collybia confluens 113
Collybia, Crowded-gill Cone 132
Collybia, Distant-gill Cone
Collybia distorta 67
Collybia dryophila 111
Collybia, Enoki 114
Collybia erythropus 112
Collybia, Euro Spindle-shank 111
Collybia filamentosa 112
Collybia fuscopurpurea 113
Collybia fusipes 111
Collybia maculata 67
Collybia ocior 111
Collybia peronata 113
Collybia prolixa 67
Collybia, Rooting 117
Collybia, Rust-spotted 67
Collybia, Scaly Zoned 142
Collybia, Stalked 112
Collybia, Tufted 113
Coltriciaceae 206
Coltricia perennis 206
Common Chanterelle 28
Common Collybia 111
Common Earthball 256
Common Eyelash Cup 268
Common False Truffle 259
Common Funnel Cap 31
Common Gray Saddle 208
Common Hedgehog Tooth 9, 238
Common Laccaria 115
Common Lawn Agrocybe 106
Common Morel 7, 11, 209
Common Oyster Mushroom 7, 178
Common Park Psathyrella 95
Common Puffball 11, 261
Common Ringed Panaeolus 95
Common Stump Psathyrella 94
Common Thelophora 229
Common Tufted Mycena 116
Common Tumbling Puffball 255
Common White Saddle 207
Common Wood-chip Psilocybe 107
Complex, Deadly Conocybe 96
Concybe huijsmanii 140
Conifer False Morel 208
Conifer Tuft Psilocybe 86
Conifer-base Polypore 222
Coniophoraceae 229, 233
Coniophora puteana 17, 233
Conocybe arrhenii 96
Conocybe blattaria 96
Conocybe Complex, Deadly 96
Conocybe lactea 140
Conocybe percincta 96
Conocybe, White Lawn 140
Coprinaceae 21, 94–5, 102, 107–9, 141, 143, 174–77
Coprinus acuminatus 175
Coprinus alopecia 175
Coprinus atramentarius 17, 175
Coprinus auricomus 177
Coprinus comatus 174
Coprinus corthurnatus 176
Coprinus cortinatus 176
Coprinus disseminatus 143
Coprinus domesticus 176
Coprinus friesii 176
Coprinus micaceus 176
Coprinus niveus 176

Coprinus picaceus 175
Coprinus plicatilis 177
Coprinus stercoreus 176
Coprinus truncorum 176
Coral, Bitter 251
Coral, Crested 249
Coral, Giant Club 241
Coral, Greening 250
Coral, Meadow 249
Coral, Pink-tipped 251
Coral, Pipe Club 241
Coral Tooth 239
Coral, Tuber Club 242
Coral, Yellow Spindle 240
Cordyceps bifusispora 244
Cordyceps capitata 245
Cordyceps longisegmentatis 245
Cordyceps militaris 244
Cordyceps ophioglossoides 245
Coriolaceae 223–25, 227
Cort, Bitter Lilac 76
Cort, Deadly 73
Cort, Deadly Conifer 72
Cort, Edible 71
Cort, Elegant 77
Cort, Geranium 71
Cortinariaceae 67, 69–77, 83, 87, 91, 93–4, 98–102, 140
Cortinarius alboviolaceus 73
Cortinarius anserinus 74
Cortinarius armillatus 72
Cortinarius atrovirens 76
Cortinarius aureofulvus 77
Cortinarius bolaris 69
Cortinarius caerulescens 76
Cortinarius calochrous 74
Cortinarius camphoratus 73
Cortinarius cinnamomeus 70
Cortinarius citrinus 77
Cortinarius cliduchus 75
Cortinarius collinitus 75
Cortinarius dibaphus 76
Cortinarius elegantissimus 77
Cortinarius limonius 72
Cortinarius malachius 73
Cortinarius mucosus 75
Cortinarius olidus 75
Cortinarius orellanus 23, 73
Cortinarius osmophorus 77
Cortinarius paleaceus 71
Cortinarius paragaudis 72
Cortinarius phoeniceus 70
Cortinarius pholideus 70
Cortinarius rubellus 23, 72
Cortinarius rufo-olivaceus 76
Cortinarius saginus 75
Cortinarius semisanguineus 70
Cortinarius sodagnitus 76
Cortinarius splendens 77
Cortinarius subtorvus 74
Cortinarius torvus 74
Cortinarius traganus 73
Cortinarius triumphans 75
Cortinarius violaceus 71
Cort, Lovely Poison 77
Cort, Mottled Poison 69
Cort, Orange Slime 75
Cort, Plum-scented 74
Cort, Poison Dye 70
Cort, Red and Green 76
Cort, Red-banded 72
Cort, Scaly 70
Cort, Sheathed 74
Cort, Silvery Violet 73
Cort, Yellow-banded 75
Cotton Caterpillar Asco 244
Crab Russula 127
Cramp Balls Asco 257
Craterellus cantharellus 276
Craterellus cornucopioides 275
Craterellus fallax 275
Creolophus cirrhatus 239
Crepidotaceae 183
Crepidotus calolepis 183
Crepidotus cesatii 183
Crepidotus inhonestus 183
Crepidotus luteolus 183
Crepidotus mollis 183
Crepidotus variabilis 183
Crep, Soft 183
Crep, Varied 183
Crested Coral 249
Crimson Wax Cap 56
Crinipellis perniciosa 142
Crinipellis stipitaria 142
Crinkle-gilled Pax 182
Crucibulum crucibuliforme 274
Cucumber-scented Mushroom 108
Cultivated Agaricus 161
Cup, Bladder 266
Cup, Brown Oak 270
Cup, Green Stain 269
Cup, Lemon 273
Cup, Lemon-peel 269
Cuplike Morel 265
Cup, Olive-brown 266
Cup, Orange-peel 268
Cup, Tuber 270
Cup, Yellow-milk 267
Curly-haired Elf Cup 264
Cyathus olla 274
Cyathus stercoreus 274
Cyathus striatus 274
Cystoderma adnatifolium 96
Cystoderma ambrosii 97
Cystoderma amianthinum 97
Cystoderma carcharias 97
Cystoderma, Cinnabar 96
Cystoderma fallax 97
Cystoderma granulosum 96
Cystoderma jasonis 97
Cystoderma, Pink-gray 97
Cystoderma, Saffron 97
Cystoderma terrei 96

D

Dacryomycetaceae 250
Daedalea quercina 226
Daedaleopsis confragosa 227
Daldinia concentrica 257
Dark Gill-edge Mycena 118
Dark Gray Trich 59
Deadly Conifer Cort 72
Deadly Conocybe Complex 96
Deadly Cort 73
Deadly Galerina 91
Deadly Inocybe 99
Dead-man's Fingers Asco 245
Death Cap Amanita 151
Dentate Elf Cup 265
Destroying Angel 150

Dirty Trich Complex 60
Disciotis venosa 265
Distant-gill Cone Collybia 133
Distant-gilled Lactarius 52
Dog Stinkhorn 246
Dotted-stalk Bolete 200
Dotted-stem Bolete 189
Dryad's Saddle Polypore 203
Dry-rot Mushroom 229
Dry Scaly Pholiota 79
Dull Lactarius 51
Dumontinia tuberosa 270
Dung Psilocybe 90
Dwarf Earth Star 279

E

Earth Cup, Sandy 267
Earth Star, Barometer 278
Earth Star, Collared 278
Earth Star, Dwarf 279
Earth Star, Sessile 279
Earth Star, Striated 280
Earth-ball Bolete 194
Earthball, Common 256
Earthball, Scaly 263
Edible Cort 71
Edible Yellow Trich 63
Elaphomyces granulatus 259
Elaphomyces muricatus 259
Elaphomycetaceae 259
Elegant Cort 77
Elf Cup, Curly-haired 264
Elf Cup, Dentate 265
Emetic Russula 128

Enoki Collybia 114
Entoloma, Aborted 253
Entoloma abortivum 253
Entoloma, Beech Woods 68
Entoloma bloxamii 110
Entoloma caesiosinctum 144
Entoloma cetratum 109
Entoloma chalybaeum 144
Entoloma clypeatum 68
Entoloma conferendum 17, 110
Entoloma euchroum 110
Entoloma, Greenish 144
Entoloma, Honey-colored 109
Entoloma incanum 144
Entoloma lanuginosipes 109
Entoloma, Lead Poison 68
Entoloma nidorosum 68
Entoloma nitidum 110
Entoloma pallescens 109
Entoloma porphyrophaeum 69
Entoloma, Purplish, 69
Entoloma querquedula 144
Entoloma rhodopolium 68
Entoloma rosea 116
Entoloma, Saw-gilled Blue-cap 144
Entoloma sericeum 110
Entoloma serrulatum 144
Entoloma sinuatum 68
Entoloma, Star-spored 110
Entoloma, Steel-blue 110
Entolomataceae 17, 21, 41, 68–9, 109–10, 144, 253
Euro Beech Polypore 223
Euro Cow Bolete 200
Euro Emetic Russula 129
Euro Field Bonnet 134
Euro Garlic Marasmius 114
Euro Grass Lepiota 167
Euro Orange Lepiota 168
Euro Orange-staining Mycena 119
Euro Porcelain Mushroom 79
Euro Red-staining Lepiota 170
Euro Scaber-stalk 198
Euro Slimy Lactarius 47
Euro Spindle-shank Collybia 111
Euro Summer Truffle 258
Euro Trumpet Oyster 179
Euro Varnished Polypore 216
Euro White Truffle 259
Exidiaceae 283
Exidia glandulosa 271, 283
Exidia truncata 271, 283
Eyelash Cup, Common 268

F

Fairy Ring Marasmius 117
Fall Oyster Mushroom 180
False Chanterelle 29
False Edible Trich 63
False Lepiota Slime-veil 164
Fawn Pluteus 171
Fetid Marasmius 139
Fetid Russula 121
Field Volvariella 155
Fine-scaly Honey Mushroom 80
Fine-scaly Red Wax Cap 143
Fistulinaceae 20, 213
Fistulina hepatica 20, 213
Flame Pluteus 173
Flammulina fennae 114
Flammulina ononidis 114
Flammulina velutipes 114
Fleecy Lactarius 44
Flowerpot Lepiota 170
Fluted Bird's Nest 274
Fly Amanita 6, 146
Fomes fomentarius 19, 219
Fomitaceae 219
Fomitopsidaceae 212, 222, 226
Fragile Russula 129
Fragrant Lactarius 53
Freckle-gilled Gym 94
Fringed Panaeolus 107
Funnel Cap, Alcohol 40
Funnel Cap, Anise 39
Funnel Cap, Clouded 40
Funnel Cap, Common 31
Funnel Cap, Giant 32
Funnel Cap, Goblet
Funnel Cap, Gray-brown 34
Funnel Cap, Poison Lawn 34
Funnel Cap, Poison Roadside 42
Funnel Cap, Shimeji 41
Funnel Cap, Stout-stalked 33
Funnel Cap, Tawny 31
Funnel Polypore 206
Funnel Tooth 236

G

Galerina calyptrata 140
Galerina, Deadly 91
Galerina hypnorum 140
Galerina marginata 90
Galerina mutabilis 90
Galerina paludosa 132
Galerina, Scaly-veiled 90
Galerina sphagnorum 140
Galerina tibiicystis 132
Galerina, Tiny Bog 140
Galerina unicolor 91
Ganoderma applanatum 17, 217
Ganoderma australe 217
Ganoderma carnosum 206
Ganoderma lucidum 206
Ganoderma pfeifferi 216
Ganodermataceae 206, 216, 217
Geastraceae 278–80
Geastrum elegans 279
Geastrum fimbriatum 279
Geastrum pectinatum 279
Geastrum rufescens 279
Geastrum schmidelii 279
Geastrum striatum 280
Geastrum triplex 278
Gemmed Agaric 149
Geoglossaceae 242, 243
Geoglossum fallax 242
Geopora arenicola 267
Geranium Cort 71
Geranium Russula 122
Giant Club Coral 241
Giant Funnel Cap 32
Giant Puffball 254
Gilled Bolete 42
Gill Polypore 227
Gloeophyllum abietinum 222
Gloeophyllum odoratum 222
Gloeophyllum sepiarium 222
Goblet Funnel Cap 32
Golden Chanterelle 275
Golden Phaeolepiota 83
Golden Pluteus 173
Golden Wax Cap 104
Gomphaceae 276
Gomphidiaceae 37, 38, 198–201
Gomphidius glutinosus 38
Gomphidius roseus 38
Gomph, Pine 37
Gomph, Rosy 38
Gomphus bonarii 276
Gomphus floccosus 276
Gomphus kauffmanii 276
Gray and Lilac Inocybe 101
Gray-brown Funnel Cap 34
Gray Fire Polypore 218
Graying Yellow Russula 123
Gray-lined Mycena 119
Green and Pink Inocybe 98
Greening Coral 250
Green Quilt Russula 131
Green Stain Cup 269
Grifola frondosa 216
Grisette, Orange 153
Grisette, Tawny 152
Gym, Big Laughing 83
Gym, Freckle-gilled 94
Gymnopilus penetrans 94
Gymnopilus picreus 94
Gymnopilus spectabilis 83
Gymnosporangium clavariiforme 250
Gypsy Rozites 87
Gyromitra brunnea 208
Gyromitra caroliniana 208
Gyromitra esculenta 208
Gyromitra gigas 208
Gyromitra infula 208
Gyroporus castaneus 194
Gyroporus cyanescens 195

H

Hairy Polypore 224
Hairy Stereum 230
Half-free Morel 210
Hapalopilus rutilans 213
Hebeloma candidipes 93
Hebeloma crustuliniforme 67
Hebeloma edurum 67
Hebeloma leucosarx 67
Hebeloma mesophaeum 93
Hebeloma, Poison Pie 67
Hebeloma radicosum 82
Hebeloma, Rooting 82
Hebeloma sinapizans 67
Hebeloma, Veiled 93
Hedgehog Puffball 261
Hedgehog Tooth, Common 9, 238
Helvellaceae 207–8
Helvella crispa 207
Helvella lacunosa 208
Hen-of-the-Woods Polypore 216
Hericiaceae 239
Hericium coralloides 239
Heterobasidion annosum 19, 222
Honey-colored Entoloma 109
Honey Mushroom 80
Honey Mushroom, Fine-scaly 80
Honey Mushroom, Ringless 42
Horse Agaricus 157
Horsehair Marasmius 138
Humaria hemisphaerica 267
Hyaloriaceae 235
Hydnaceae 238
Hydnangiaceae 115
Hydnellum ferrugineum 237
Hydnellum peckii 237
Hydnum albidum 238
Hydnum repandum 238
Hydnum rufescens 238
Hydnum umbilicatum 9, 238
Hygrocybe calciphila 143
Hygrocybe calyptraeformis 103
Hygrocybe cantharellus 30
Hygrocybe ceracea 104
Hygrocybe chlorophana 104
Hygrocybe citrinovirens 103
Hygrocybe coccinea 105
Hygrocybe conica 104
Hygrocybe glutinipes 104
Hygrocybe helobia 143
Hygrocybe miniata 143
Hygrocybe nivea
see *Hygrocybe virginea*
Hygrocybe persistens 104
Hygrocybe pratensis 38
Hygrocybe psittacina 105
Hygrocybe punicea 21, 56, 105
Hygrocybe russocoriacea 39
Hygrocybe spadicea 103
Hygrocybe splendidissima 56, 105
Hygrocybe virginea 39
Hygrophoraceae 37, 38, 56, 103–6
Hygrophoropsis aurantiaca 29
Hygrophorus discoxanthus 106
Hygrophorus eburneus 106

Hygrophorus hypothejus 37
Hygrophorus lucorum 37
Hygrophorus nemoreus 38
Hymenochaetaceae 218, 221, 231
Hymenochaete rubiginosa 231
Hypholoma capnoides 86
Hypholoma elongatum 87
Hypholoma fasciculare 86
Hypholoma myosotis 107
Hypholoma radicosum 86
Hypholoma sublateritium 87
Hypholoma udum 87
Hypomyces hyalinus 147
Hypomyces lactifluorum 43
Hypoxylon fragiforme 257
Hypoxylon fuscum 257
Hypoxylon howeianum 257
Hypoxylon rubiginosum 257

I

Inky Cap, Alcohol 175
Inky Cap, Magpie 175
Inky Cap, Massed Lesser 143
Inky Cap, Mica 176
Inky Cap, Shaggy-mane 174
Inky Cap, Snow-white 176
Inky Cap, Umbrella 177
Inocybe asterospora 102
Inocybe cincinnata 101
Inocybe corydalina 98
Inocybe, Deadly 99
Inocybe erubescens 99
Inocybe geophylla 100
Inocybe godeyi 99
Inocybe, Gray and Lilac 101
Inocybe, Green and Pink 98
Inocybe griseolilacina 101
Inocybe haemacta 98
Inocybe lacera 101
Inocybe lanuginosa 101
Inocybe maculata 100
Inocybe margaritispora 102
Inocybe napipes 102
Inocybe pudica 99
Inocybe pusio 101
Inocybe, Red-staining 99
Inocybe rimosa 100
Inocybe sindonia 100
Inocybe, Star-spored 102
Inocybe, Straw-colored 100
Inocybe, Torn-cap 101
Inocybe, White or Lilac 100
Inonotus cuticularis 221
Inonotus hispidus 221
Inonotus nodulosus 221
Inonotus radiatus 221
Inonotus rheades 221
Iodine Mycena 136
Iodine Russula 127

J

Jack O'Lantern 29
Jelly, Antler 250
Jelly Babies Asco 243
Jelly, Black Brain 283
Jelly, Bracket 230
Jelly, Brown Leafy 282
Jelly-drop Cup, Beech 271
Jelly-drop Cups, Black, 271
Jelly, Toothed 235
Jelly, Wood Ear 281
Jelly, Yellow Brain 282

K

King Bolete 187
Kuehneromyces mutabilis see *Galerina mutabilis*

L

Laccaria amethystina 115
Laccaria bicolor 115
Laccaria, Common 115
Laccaria fraterna 115
Laccaria laccata 115
Laccaria ochropurpurea 115
Laccaria proxima 115
Laccaria pumila 115
Laccaria, Purple 115
Laccaria trullisata 115
Lachnellula subtilissima 273
Lacrymaria glareosa 102
Lacrymaria pyrotricha 102
Lacrymaria velutina 102
Lactarius acris 48
Lactarius aquifluus 55
Lactarius badiosanguineus 51
Lactarius bertillonii 44
Lactarius blennius 47
Lactarius camphoratus 53
Lactarius chrysorrheus 52
Lactarius circellatus 47, 48
Lactarius, Coconut-scented 54
Lactarius controversus 45
Lactarius corrugis 52
Lactarius curtus 49
Lactarius deliciosus 46
Lactarius deterrimus 46
Lactarius, Distant-gilled 52
Lactarius, Dull 51
Lactarius, Euro Slimy 47
Lactarius, Fleecy 44
Lactarius flexuosus 49
Lactarius fluens 47
Lactarius, Fragrant 53
Lactarius fuliginosus 48
Lactarius glaucescens 43
Lactarius glyciosmus 54
Lactarius helvus 55
Lactarius hemicyaneus 46
Lactarius hepaticus 51
Lactarius hygrophoroides 52
Lactarius ichoratus 50
Lactarius lacunarum 50
Lactarius lignyotus 48
Lactarius, Liver, 51
Lactarius, Luscious 54
Lactarius mammosus 54
Lactarius, Mild 50
Lactarius mitissimus 50

Lactarius musteus 49
Lactarius, Mutagen 47
Lactarius necator 47
Lactarius, Oak 52
Lactarius, Orange Latex 46
Lactarius, Pallid 49
Lactarius pallidus 49
Lactarius, Peppery 43
Lactarius, Pink Gill 45
Lactarius piperatus 43
Lactarius, Poison 55
Lactarius pterosporus 48
Lactarius pubescens 45
Lactarius pyrogalus 48
Lactarius quietus 52
Lactarius, Red Gastroid 256
Lactarius, Red-hot 53
Lactarius rufus 53
Lactarius salmonicolor 46
Lactarius sanguifluus 46
Lactarius scoticus 45
Lactarius serifluus 52
Lactarius, Slimy Lead 49
Lactarius subdulcis 51
Lactarius theiogalus 50
Lactarius torminosus 45
Lactarius trivialis 49
Lactarius vellereus 44
Lactarius, Velvety 48
Lactarius vietus 48
Lactarius volemus 54
Lactarius, Woolly 45
Lactarius, Yellow-staining 50
Lactarius, Zebra-spored 48
Laetiporus sulphureus 215
Larch Bolete 199
Late Fall Wax Cap 37
Late-season Mycena 134
Lawn Agrocybe, Common 106
Lawn Mower's Mushroom 141
Lawn Mycena, Chlorine 135
Layered Tooth 239
Lead Poison Entoloma 68
Leafy Jelly, Brown 282
Leather Bracket, Rigid 231
Leccinum aurantiacum 198
Leccinum crocipodium 195
Leccinum piccinum 198
Leccinum quercinum 198
Leccinum scabrum 196
Leccinum variicolor 196
Leccinum versipelle 197
Leccinum vulpinum 198
Le Gal's Bolete 191
Lemon Cup 273
Lemon-peel Cup 269
Lentinellus castoreus 179
Lentinellus cochleatus 179
Lentinellus, Cockleshell 179
Lentinellus micheneri 179
Lentinellus ursinus 178
Lentinellus vulpinus 179
Lentinula edodes 7
Lentinus lepideus 35
Lentinus tigrinus 35
Lentinus, Tiger 35
Lenzites betulina 227
Leotiaceae 20, 243, 269, 271–73, 283
Leotia lubrica 243
Lepiota alba 168
Lepiota aspera 167
Lepiota brunneoincarnata 169
Lepiota, Burnt-rubber 169
Lepiota castanea 169
Lepiota clypeolaria 168
Lepiota Complex, Deadly 169
Lepiota cristata 169
Lepiota, Euro Grass 167
Lepiota, Euro Orange 168
Lepiota, Euro Red-staining 170
Lepiota, Flowerpot 170
Lepiota fulvella 169
Lepiota hystrix 167
Lepiota ignivolvata 168
Lepiota lilacea 169
Lepiota oreadiformis 167
Lepiota, Parasol 165
Lepiota perplexum 167
Lepiota pseudohelveola 169
Lepiota, Shaggy Parasol 166
Lepiota, Shaggy-stalked 168
Lepiota, Sharp-scaled 167
Lepiota, Slime-veil False 164
Lepiota, Smooth 164
Lepiota ventriosospora 168
Lepista flaccida 31
Lepista gilva 31
Lepista irina 57
Lepista nuda 57
Lepista personata 58
Lepista sordida 57
Leucoagaricus leucothites 164
Leucocoprinus badhamii 170
Leucocoprinus luteus 170
Leucopaxillus giganteus 32
Leucopaxillus giganteus 32
Liberty Cap Psilocybe 141
Lichen Agaric 36
Limacella glioderma 164
Limacella guttata 164
Liver-brown Polypore 204
Liver Lactarius 51
Lophodermium piceae 19
Lovely Poison Cort 77
Luminescent Panellus 181
Luscious Lactarius 54
Lycoperdaceae 16, 254–55, 260–63
Lycoperdon americanum 261
Lycoperdon echinatum 261
Lycoperdon lividum 260
Lycoperdon mammiforme 261
Lycoperdon molle 262
Lycoperdon nigrescens 261
Lycoperdon perlatum 11, 261
Lycoperdon pyriforme 260
Lyophyllum, Bog 132
Lyophyllum connatum 42
Lyophyllum decastes 41
Lyophyllum fumosum 41
Lyophyllum palustre 132

M

Macrocystidia cucumis 108
Macrolepiota permixta 165
Macrolepiota procera 165
Macrolepiota rhacodes 166
Macrotyphula fistulosa 241
Macrotyphula juncea 241
Magpie Inky Cap 175
Marasmiellus candidus 139
Marasmiellus ramealis 139
Marasmiellus vaillantii 139
Marasmius alliaceus 114
Marasmius androsaceus 138
Marasmius bulliardii 177
Marasmius curreyi 177
Marasmius, Euro Garlic 114
Marasmius, Fairy Ring 117
Marasmius, Fetid 139
Marasmius, Horsehair 138
Marasmius limosus 177
Marasmius oreades 117
Marasmius, Pinwheel 177

Marasmius rotula 177
Marasmius scorodonius 114
Marasmius, Twig 139
Massed Lesser Inky Cap 143
Matsutake, Brown 81
Matsutake, White 81
Meadow Agaricus 160
Meadow Coral 249
Meadow Puffball 255
Megacollybia platyphylla 66
Melanoleuca cognata 65
Melanoleuca melaleuca 65
Melanoleuca polioleuca 65
Melastiza chateri 268
Meripilus giganteus 214
Mica Inky Cap 176
Micromphale foetidum 139
Micromphale perforans 139
Midnight Blue Bolete 192
Mild Lactarius 50
Milk White Russula 120
Mitrula paludosa 243
Morchellaceae 209–10, 265
Morchella elata 210
Morchella esculenta 11, 209
Morchella semilibera 210
Morel, Bell 209
Morel, Black 210
Morel, Common 7, 11, 209
Morel, Conifer False 208
Morel, Cuplike 265
Morel, False Conifer 208
Morel, Half-free 210
Mosaic Puffball 263
Moss Agaric, Orange 36
Mottled Poison Cort 69
Mushroom, Cauliflower 252
Mushroom, Common Oyster 7, 178
Mushroom, Cucumber-scented 108
Mushroom, Dry-rot 229
Mushroom, Euro Porcelain 79
Mushroom, Fall Oyster 180
Mushroom, Fine-scaly Honey 80
Mushroom, Honey 80
Mushroom, Lawn Mower's 141
Mushroom, Orange Discus 273
Mushroom, Paddy Straw 161
Mushroom, Shiitake 7, 161
Mushroom, Split-gill 181
Mushroom, St. George's 58
Mushroom, Wet-rot 233
Mutagen Lactarius 47
Mutinus caninus 246
Mutinus ravenelii 246
Mycena abramsii 135
Mycena acicula 137
Mycena adonis 138
Mycena arcangeliana 134
Mycena belliae 135
Mycena, Bleeding 136
Mycena capillaripes 135
Mycena, Chlorine Lawn 135
Mycena citrinomarginata 134
Mycena, Clustered Oak 133
Mycena, Common Tufted 116
Mycena crocata 119, 136
Mycena, Dark Gill-edge 118
Mycena diosma 118
Mycena epipterygia 135
Mycena erubescens 137
Mycena, Euro Field 134
Mycena, Euro Orange-staining 119
Mycena filopes 136
Mycena flavescens 134
Mycena flavoalba 138
Mycena galericulata 116
Mycena galopus 137
Mycena, Gill-edge 118
Mycena, Gray-lined 119
Mycena haematopus 136
Mycena inclinata 133, 136
Mycena, Iodine 136
Mycena, Late-season 134
Mycena leptocephala 135
Mycena maculata 133
Mycena metata 136
Mycena olivaceomarginata 134
Mycena pelianthina 118
Mycena, Poison Radish Ground 118
Mycena polygramma 119
Mycena pura 118
Mycena rorida 135
Mycena rubromarginata 134
Mycena sanguinolenta 119, 136
Mycena seyneii 132, 134
Mycena stipata 135
Mycena, Tiny Orange-cap 137
Mycena vitilis 119
Mycena, White Milk 137
Mycena, Yellow-stalked 135
Mycena, Yellow-white 138
Myriostoma coliforme 278
Myxomphalia maura 93

N

Neobulgaria pura 271
Nidulariaceae 274
Nolanea cetrata
see *Entoloma cetratum*

O

Oak Cup, Brown 270
Oak Lactarius 52
Oak Mycena, Clustered 133
Oak Trich 62
Ocher-gilled Trich 65
Ocher-green Pholiota 92
Old-Man-of-the-Woods 185
Oligoporus rennyi 233
Oligoporus stipticus
see *Tyromyces stipticus*
Olive-brown Cup 266
Omphalina alpina 36
Omphalina ericetorum 36
Omphalina fibula
see *Rickenella fibula*
Omphalina philonotis 132
Omphalina sphagnicola 132
Omphalotus olearius 29
Onion-bagel Pholiota 78
Orange-cap Mycena, Tiny 137
Orange Caterpillar Asco 244
Orange Discus Mushroom 273
Orange Grisette 153
Orange Latex Lactarius 46
Orange Lepiota, Euro 168
Orange Moss Agaric 36
Orange-peel Cup 268
Orange Scaber-stalk Bolete 197
Orange Slime Cort 75
Otidea cantharella 269
Otideaceae 265, 267–69
Otidea concinna 269
Otidea leporina 269
Otidea onotica 269

Oudemansiella caussei 117
Oudemansiella mucida 79
Oudemansiella pudens 117
Oudemansiella radicata 117
Oyster, Euro Trumpet 179
Oyster Mushroom, Common 7, 178
Oyster Mushroom, Fall 180

P

Paddy Straw Mushroom 161
Paecilomyces farinosus 244
Painted Bolete 201
Pallid Lactarius 49
Panaeolina foenisecii 141
Panaeolus antillarum 95
Panaeolus ater 141
Panaeolus, Common Ringed 95
Panaeolus foenisecii see *Panaeolina foenisecii*
Panaeolus, Fringed 107
Panaeolus papilionaceus 107
Panaeolus semiovatus 95
Panellus, Luminescent 181
Panellus mitis 180, 181
Panellus serotinus 180
Panellus stypticus 181
Panther Amanita 149
Parasite, Russula 142
Parasol Lepiota 165
Parrot Wax Cap 105
Pax, Crinkle-gilled 182
Paxillaceae 29, 35, 182, 194–95
Paxillus atrotomentosus 182
Paxillus corrugatus 182
Paxillus filamentosus 35
Paxillus involutus 35
Paxillus panuoides 182
Pax, Poison 35
Pax, Velvet 182
Peniophoraceae 230, 232
Peppery Bolete 185
Peppery Lactarius 43
Perenniporiaceae 222
Perigord Truffle 258
Pestle-shaped Puffball 262
Peziza badia 266
Pezizaceae 20, 266–67
Peziza michelii 267
Peziza micropus 266
Peziza repanda 266
Peziza succosa 267
Peziza succosella 267
Peziza varia 266
Peziza vesiculosa 266
Phaeolaceae 211, 215, 220, 233
Phaeolepiota aurea 83
Phaeolepiota, Golden 83
Phaeolus schweinitzii 220
Phallaceae 16, 246–47
Phallus duplicatus 247
Phallus hadriani 247
Phallus impudicus 247
Phellinus igniarius 218
Phellodon confluens 236
Phellodon melaleucus 236
Phellodon niger 236
Phellodon tomentosus 236
Phlebia radiata 228
Phlebia, Trembling 228
Phlebia tremellosa 228
Pholiota, Alder 91
Pholiota alnicola 91
Pholiota aurivellus 78
Pholiota, Charcoal 93
Pholiota, Dry Scaly 79
Pholiota flavida 91
Pholiota gummosa 92
Pholiota highlandensis 93
Pholiota jahnii 78
Pholiota lenta 92
Pholiota limonella 78
Pholiota, Ocher-green 92
Pholiota, Onion-bagel 78
Pholiota pinicola 91
Pholiota salicicola 91
Pholiota scamba 92
Pholiota, Slimy Ground 92
Pholiota squarrosa 79
Pholiota squarrosoides 79
Phylloporus leucomycelinus 42
Phylloporus rhodoxanthus 42
Phyllotopsis nidulans 180
Pinecone Tooth 234
Pine Dye Polypore 220
Pine Gomph 37
Pink Gill Lactarius 45
Pink-gray Cystoderma 97
Pink Lawn Trich 116
Pink-tipped Coral 251
Pink Wax Cap 103
Pinwheel Marasmius 177
Pipe Club Coral 241
Piptoporus betulinus 212
Pleurocybella porrigens 180
Pleurotus citrinopileatus 179
Pleurotus cornucopiae 179
Pleurotus dryinus 178
Pleurotus eryngii 179
Pleurotus ostreatus 178
Pleurotus pulmonarius 178
Plums-and-Custard Wood Trich 66
Plum-scented Cort 74
Pluteaceae 154–55, 171–73
Pluteus admirabilis 173
Pluteus aurantiorugosus 173
Pluteus cervinus 171
Pluteus chrysophaeus 173
Pluteus, Fawn 171
Pluteus, Flame 173
Pluteus, Golden 173
Pluteus plautus 172
Pluteus pouzarianus 171
Pluteus romellii 173
Pluteus umbrosus 172
Poison Dye Cort 70
Poison Gas Trich 64
Poison Lactarius 55
Poison Lawn Funnel Cap 34
Poison Lawn Psilocybe 89
Poison Pax 35
Poison Pie Hebeloma 67
Poison Radish Ground Mycena 118
Poison Roadside Funnel Cap 42
Polyporaceae 35, 178–79, 202–5
Polypore, Alder Bracket 221

Polypore, Anise-scented 222
Polypore, Artist's 217
Polypore, Beefsteak 213
Polypore, Birch 212
Polypore, Bitter 211
Polypore, Black-footed 205
Polypore, Black-staining 214
Polypore, Cinnabar 225
Polypore, Conifer-base 222
Polypore, Dryad's Saddle 203
Polypore, Euro Beech 223
Polypore, Euro Varnished 216
Polypore, Funnel 206
Polypore, Gill 227
Polypore, Gray Fire 218
Polypore, Hairy 224
Polypore, Hen-of-the-Woods 216
Polypore, Liver-brown 204
Polypore, Pine Dye 220
Polypore, Powder-puff 233
Polypore, Purple-dye 213
Polypore, Purple-tooth 226
polypores 202
Polypore, Shaggy 221
Polypore, Sheep 202
Polypore, Smoky 225
Polypore, Split-pore 232
Polypore, Thick-maze 226
Polypore, Thin-maze 227
Polypore, Tinder 219
Polypore, Tuberous 204
Polypore, Turkey-tail 224
Polypore, Umbrella 202
Polypore, Varnished 206
Polypore, Winter 205
Polyporus badius 204
Polyporus brumalis 205
Polyporus ciliatus 205
Polyporus melanopus 204
Polyporus squamosus 203
Polyporus tuberaster 204
Polyporus umbellatus 202
Polyporus varius 205
Poplar Agrocybe 85
Porcelain Mushroom, Euro 79
Porphyrellus porphyrosporus 184
Postia caesia 211
Powder-puff Polypore 233
Pretty Poison Bolete 191
Prince Agaricus 158
Psathyrella ammophila 109
Psathyrella candolleana 95
Psathyrella, Common Park 95
Psathyrella, Common Stump 94
Psathyrella conopilus 109
Psathyrella, Dark Cone 109
Psathyrella foenisecii
see *Panaeolina foenisecii*
Psathyrella multipedata 108
Psathyrella piluliformis 94
Psathyrella pygmaea 143
Psathyrella spadiceogrisea 95
Psathyrella, Tufted 108
Psathyrella, Weeping Gilled 102
Pseudoclitocybe cyathiformis 32
Pseudocolus fusiformis 277
Pseudohydnum gelatinosum 235
Psilocybe, Blue-green 88
Psilocybe, Brick Cap 87
Psilocybe, Burgundy Caps 89
Psilocybe caerulipes 107
Psilocybe, Common Wood-chip 107
Psilocybe, Conifer Tuft 86
Psilocybe cubensis 84
Psilocybe cyanescens 107
Psilocybe, Dung 90
Psilocybe fimetaria 141
Psilocybe, Liberty Cap 141
Psilocybe, Poison Lawn 89
Psilocybe, Red-cap 88
Psilocybe, San Isidro 84
Psilocybe, Scaly-stalked 84
Psilocybe semilanceata 141
Psilocybe squamosa 84
Psilocybe, Sulfur Tuft 86
Puffball 16
Puffball, Common 11, 261
Puffball, Common Tumbling 255
Puffball, Giant 254
Puffball, Hedgehog 261
Puffball-in-Aspic 263
Puffball, Meadow 255
Puffball, Mosaic 263
Puffball, Pestle-shaped 262
Puffball, Stump 260
Pungent False Blewit 57
Pungent Russula 131
Purple-brown Amanita 151
Purple-dye Polypore 213
Purple Jelly-drop Cup 272
Purple Laccaria 115
Purple Silver-leaf Stereum 231
Purple-tooth Polypore 226
Purplish Entoloma 69
Purplish Yellow Agaricus 163
Pycnoporus cinnabarinus 213, 225
Pycnoporus sanguineus 225

R

Ramaria abietina 250
Ramaria apiculata 250
Ramaria botrytis 251
Ramariaceae 250–51
Ramaria eumorpha 250
Ramaria flaccida 250
Ramaria formosa 251
Ramaria gracilis 251
Ramaria myceliosa 250
Ramaria sanguinea 251
Ramaria stricta 251
Ramariopsis crocea 249
Ramariopsis kunzei 249
Red and Green Cort 76
Red-banded Cort 72
Red-capped Bolete 193
Red-cap Psilocybe 88
Red-cracking Bolete 192
Red Gastroid Lactarius 256
Red-hot Lactarius 53
Red-staining Agaricus 163
Red-staining Inocybe 99
Red-stain Stereum 232
Rickenella fibula 36, 137
Rickenella setipes 36
Rigid Leather Bracket 231
Ringless Honey Mushroom 42
Rooting Collybia 117
Rooting Hebeloma 82
Rosy Firm Russula 126
Rosy Gomph 38
Rozites caperata 87
Rozites, Gypsy 87
Russula acrifolia 122
Russula adusta 122
Russula aeruginea 125
Russula albonigra 122
Russula anthracina 122
Russula atropurpurea 130
Russula, Bare-toothed 125

Russula betularum 128
Russula, Blackening 122
Russula, Blood-red 130
Russula brunneoviolacea 130
Russulaceae 17, 20, 43–55, 120–31, 256
Russula choloroides 120
Russula claroflava 123
Russula, Crab 127
Russula cutefracta 131
Russula cyanoxantha 124
Russula delica 120
Russula densifolia 122
Russula, Emetic 128
Russula emetica 128
Russula, Euro Emetic 129
Russula fagiticola 128
Russula farinipes 122
Russula fellea 122
Russula, Fetid 121
Russula foetens 121
Russula, Fragile 129
Russula fragilis 129
Russula, Geranium 122
Russula, Graying Yellow 123
Russula, Green Quilt 131
Russula helodes 123, 130
Russula heterophylla 125
Russula illota 121
Russula integra 124
Russula, Iodine 127
Russula laurocerasi 121
Russula mairei 23, 129
Russula, Milk White 120
Russula, Variable 124
Russula nigricans 122
Russula ochroleuca 123
Russula odorata 126
Russula paludosa 128
Russula Parasite 142
Russula puellaris 126
Russula, Pungent 131
Russula queletii 131
Russula raoultii 123
Russula risigallina 123
Russula romellii 130
Russula rosea 126
Russula, Rosy Firm 126
russulas 17
Russula sanguinea 130
Russula sardonia 131
Russula solaris 123
Russula, Spring 130
Russula subfoetens 121
Russula, Tacky Green 125
Russula, Tall Bog 128
Russula turci 127
Russula velenovskyi 129
Russula velutipes 126
Russula versicolor 126
Russula vesca 125
Russula vinosa 124
Russula violeipes 123
Russula virescens 131
Russula, Yellow-ocher 123
Russula, Yellow-staining 126
Russula xerampelina 23, 127
Rust-spotted Collybia 67
Rutstroemia bolaris 270
Rutstroemia firma 270

S

Saddle, Common Gray 208
Saddle, Common White 207
Saffron Cystoderma 97
Salt-loving Agaricus 162
San Isidro Psilocybe 84
Sandy Earth Cup 267
Sarcodon glaucopus 237
Sarcodon imbricatum 237
Sarcodon scabrosus 237
Sarcoscypha austriaca 264
Sarcoscyphaceae 264
Sarcoscypha coccinea 264
Satan's Bolete 191
Satin Wax Cap 106
Saw-gilled Blue-cap Entoloma 144
Scaber-stalk Bolete, Brown 196
Scaber-stalk Bolete, Orange 197
Scaber-stalk, Euro 198
Scaber-stalk, Yellow-pored 195
Scales, Yellow 6
Scaly Cort 70
Scaly Earthball 263
Scaly Earth-tongue Asco 242
Scaly-stalked Psilocybe 84
Scaly Tooth, Blue-footed 237
Scaly-veiled Galerina 90
Scaly Zoned Collybia 142
Scarlet-stemmed Bolete 190
Scarlet Wax Cap 105
Schizophyllaceae 181, 228, 231
Schizophyllum commune 181
Schizopora paradoxa 232
Scleroderma citrinum 256
Sclerodermataceae 256, 278
Scleroderma verrucosum 263
Sclerotiniaceae 270
Scutellinia scutellata 268
Sepedonium chrysospermum 187
Serpula lacrymans 229
Sessile Earth Star 279
Shaggy-mane Inky Cap 174
Shaggy Parasol Lepiota 166
Shaggy Polypore 221
Shaggy-stalked Lepiota 168
Shameless Stinkhorn 247
Sharp-scaled Lepiota 167
Sheathed Cort 74
Sheep Polypore 202
Shield-cap, Velvety 172
Shiitake Mushroom 7, 161
Shimeji Funnel Cap 41
Sickener, The
see Russula, Emetic
Silver-leaf Stereum, Purple 231
Silvery Violet Cort 73
Slime-veil False Lepiota 164
Slimy Ground Pholiota 92
Slimy Lead Lactarius 49
Slippery Jack Bolete 198
Smoky Polypore 225
Smooth Chanterelle 276
Smooth Lepiota 164
Snow-white Inky Cap 176
Snowy Wax Cap 39

Soapy Trich 61
Soft Crep 183
Sparassidaceae 252
Sparassis brevipes 252
Sparassis crispa 252
Sparassis herbstii 252
Spathularia flavida 243
Spindle Coral, Yellow 240
Spindle-stemmed Bolete 188
Spinellus fusiger 11, 136
Split-gill Mushroom 181
Split-pore Polypore 232
Spotted Gill Trich 60
Spring Agaricus 161
Spring Russula 130
Spring Wood-chip Agrocybe 85
St. George's Mushroom 58
Stalked Collybia 112
Star-spored Entoloma 110
Star-spored Inocybe 102
Steccherinaceae 226
Steel-blue Entoloma 110
Stereopsis humphreyi 207
Stereum gausapatum 230
Stereum, Hairy 230
Stereum hirsutum 230
Stereum ochraceo-flavum 230
Stereum, Purple Silver-leaf 231
Stereum, Red-stain 232
Stereum rugosum 232
Stereum sanguinolentum 232
Stereum subtomentosum 230
Sticky Gray Trich 61
Stinkhorn, Armed 277
Stinkhorn, Caged 280
Stinkhorn, Dog 246
Stinkhorn, Shameless 247
Stout-stalked Amanita 148
Stout-stalked Funnel Cap 33
Straw-colored Inocybe 100
Striated Earth Star 280
Strobilomyces confusus 185
Strobilomyces floccopus see *Strobilomyces strobilaceus*
Strobilomyces strobilaceus 185
Strobilomycetaceae 184, 186
Strobilurus esculentus 19, 133
Strobilurus stephanocystis 133
Strobilurus tenacellus 133
Stropharia aeruginosa 88
Stropharia aurantiaca 88
Strophariaceae 78–79, 84, 86–93, 107, 141
Stropharia coronilla 89
Stropharia cyanea 88
Stropharia halophila 89
Stropharia melasperma 89
Stropharia pseudocyanea 88
Stropharia rugoso-annulata 89
Stropharia semiglobata 90
Stropharia squamosa see *Psilocybe squamosa*
Stropharia umbonatescens 90
Stump Psathyrella, Common 94
Stump Puffball 260
Suillus aeruginascens 199
Suillus bovinus 20, 200
Suillus collinitus 200
Suillus granulatus 200
Suillus grevillei 199
Suillus luteus 198
Suillus placidus 200
Suillus plorans 199
Suillus spraguei 201
Suillus variegatus 201
Sulfur Tuft Psilocybe 86
Summer Bolete 189
Syzygites megalocarpus 114

T

Tacky Green Russula 125
Tall Bog Russula 128
Tarzetta caninus 265
Tarzetta cupularis 265
Tawny Funnel Cap 31
Tawny Grisette 152
Tephrocybe anthracophilum 93
Thelephora caryophyllea 229
Thelephoraceae 229
Thelophora, Common 229
Thelephora terrestris 229
Thick-maze Polypore 226
Thin-maze Polypore 227
Tiger Lentinus 35
Tinder Polypore 219
Tiny Bog Galerina 140
Tiny Orange-cap Mycena 137
Tooth, Black 236
Tooth, Bloody 237
Tooth, Blue-footed Scaly 237
Tooth, Blushing Fragrant- 235
Tooth, Common Hedgehog 9, 238
Tooth Coral 239
Toothed Jelly 235
Tooth, Funnel 236
Tooth, Layered 239
Tooth, Pinecone 234
Torn-cap Inocybe 101
Toxic Lepidella Amanita 148
Toxic Scaly Agaricus 160
Toxic Yellowing Agaricus 159
Trametes gibbosa 223, 227
Trametes hirsuta 224
Trametes ochracea 224
Trametes pubescens 224
Trametes versicolor 224
Tree Volvariella 154
Trembling Phlebia 228
Tremellaceae 282
Tremella foliacea 282
Tremella mesenterica 282
Trichaptum abietinum 226
Trichaptum biforme 226
Trichaptum fusco-violaceum 226
Trichaster melanocephalus 278
Trich, Birch 64
Trich, Black and White 65
Trich, Burnt 62
Trich, Dark Gray 59
Trich Complex, Dirty 60
Trich, Edible Yellow 63
Trich, False Edible 63
Trich, Oak 62
Trich, Ocher-gilled 65
Trichocomaceae 244
Trichoglossum hirsutum 242
Tricholoma albobrunneum 64
Tricholoma album 62, 67
Tricholoma atrosquamosum 60
Tricholoma auratum 63
Tricholoma bufonium 64
Tricholoma caligatum 81
Tricholoma flavovirens 63
Tricholoma fulvum 64
Tricholoma lascivum 62
Tricholoma magnivelare 81
Tricholoma orirubens 60
Tricholoma pardinum 60
Tricholoma populinum 62
Tricholoma portentosum 61
Tricholoma saponaceum 61

Tricholoma scalpturatum 59
Tricholoma sciodes 60
Tricholoma sejunctum 63
Tricholoma squarrulosum 60
Tricholoma sulphureum 64
Tricholomataceae 31–34, 36, 40–42, 57–67, 79–81, 96–97, 108, 111–14, 116–19, 132–39, 142, 177, 180–81, 185
Tricholoma terreum 59
Tricholoma ustale 62
Tricholoma ustaloides 62
Tricholoma virgatum 60
Tricholomopsis decora 66
Tricholomopsis platyphylla see *Megacollybia platyphylla*
Tricholomopsis rutilans 66
Trich, Pink Lawn 116
Trich, Plums-and-Custard Wood 66
Trich, Poison Gas 64
Trich, Soapy 61
Trich, Spotted Gill 60
Trich, Sticky Gray 61
Trich, Yellow-staining 59
True Blewit 57
Truffle Caterpillar Asco 245
Truffle, Common False 259
Truffle, Euro Summer 258
Truffle, Euro White 259
Truffle, Perigord 258
Trumpet, Black 275
Trumpet Chanterelle 30
Trumpet Oyster, Euro 179
Tuberaceae 258–59
Tuber aestivum 258
Tuber brumale 258
Tuber canaliculatum 259
Tuber Club Coral 242
Tuber gibbosum 259
Tuber macrosporum 258
Tuber magnatum 259
Tuber melanosporum 258
Tuberous Polypore 204
Tufted Collybia 113
Tufted Psathyrella 108
Turkey-tail Polypore 224
Twig Marasmius 139
Tylopilus felleus 186
Typhulaceae 242
Typhula erythropus 242
Tyromyces stipticus 211

U

Umbrella Inky Cap 177
Umbrella Polypore 202

V

Varied Crep 183
Variegated Bolete 201
Varnished Polypore 206
Vascellum pratense 255
Veiled Hebeloma 93
Velvet Pax 182
Velvety Lactarius 48
Velvety Pluteus 172
Verpa bohemica 209
Verpa conica 209
Volvariella bombycina 154
Volvariella caesiotincta 154
Volvariella, Field 155
Volvariella gloiocephala 155
Volvariella surrecta 142
Volvariella, Tree 154
Volvariella volvacea 155

W

Wax Cap, Blackening 104
Wax Cap, Buff 38
Wax Cap, Crimson 56
Wax Cap, Fine-scaly Red 143
Wax Cap, Golden 104
Wax Cap, Late Fall 37
Wax Cap, Parrot 105
Wax Cap, Pink 103
Wax Cap, Satin 106
Wax Cap, Scarlet 105
Wax Cap, Snowy 39
Weeping Gilled Psathyrella 102
Wet-rot Mushroom 233
White Lawn Conocybe 140
White Matsutake 81
White Milk Mycena 137
White or Lilac Inocybe 100
White-egg Bird's Nest 274
Winter Polypore 205
Wood-chip Agrocybe 85
Wood Ear Jelly 281
Woods Agaricus 156
Woolly Lactarius 45
Wynnea americana 269

X

Xanthoria parietina 6
Xylariaceae 16, 245, 248, 257
Xylaria hypoxylon 248
Xylaria longipes 245
Xylaria mellisii 248
Xylaria polymorpha 245

Y

Yellow-banded Cort 75
Yellow Brain Jelly 282
Yellow-cracking Bolete 193
Yellowing Agaricus, Toxic 159
Yellow-milk Cup 267
Yellow-pored Scaber Stalk 195
Yellow Spindle Coral 240
Yellow-staining Lactarius 50
Yellow-staining Russula 126
Yellow-staining Trich 59
Yellow-stalked Mycena 135
Yellow-white Mycena 138

Z

Zebra-spored Lactarius 48
Zelleromyces cinnabarinus 256

ACKNOWLEDGMENTS

GARY LINCOFF thanks all those amateur mushroom hunting clubs in the United States and Canada that, over the years, have so generously shared with him what they know about their local mushrooms. He also wishes to thank all those mycologists in North America whose passion for taxonomy over the past quarter century has sparked a renaissance in our understanding of fungal relationships.

DK would like to thank Phoebe Todd-Naylor for her constant attention.

THOMAS LÆSSØE would like to thank Colin Walton and Jo Weeks for their work on this book, as well as all those involved in *The Mushroom Book* who did much of the groundwork for this project, including Paul Copsey, Neil Fletcher, Sharon Moore, Joyce Pitt, Bella Pringle, and Jo Weightman.

PICTURE CREDITS

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Printed in Singapore